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AN OUTLINE OF INDIAN PREHISTORY

D.K. BHATTACHARYA

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AN OUTLINE OF INDIAN PREHISTORY

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IN MEMORY OF

Those Rare but Rewarding moments
With the Doyen of Indian Archaeology

Prof H. D. Sankalia

With the author in 1968.

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Preface

An honest pedagogic exercise in the teaching of Prehistory in India has never been gone into. A quarter of a century of teaching has convinced me that we are constantly avoiding concepts and methodologies, because they basically emerged in the context of researches in the West. This somewhat obviously seems to point at the fact that we appear to be convincing ourselves constantly of the seeming redundancy of any knowledge of western typology or methods in the study of Indian Prehistory. This has caused untold harm to a whole generation of students.

I undertook to write this small book with a particularly keen eye on the price, so that it can reach each student. For this I had to compromise with numerous details, drop many illustrations and yet see that the basic background of methodology is not lost sight of.

I am sure that empiricists in the field are going to be far from happy, but then I have not written this book for them. The only person who would have been happy, really happy to read this book is no more with us and hence I would like to dedicate this work with all humility to his memory--to the memory of Prof. Hashmukh Dhirajlal Sankalia.

Vaishakhi, 1989

D.K.Bhattacharya

PREFACE TO THE THIRD EDITION

When a text book becomes such a running success as **An Outline of Indian Prehistory** has become during the last 2 years the author naturally feels happy. But at the same time the author also has the additional moral responsibility of adding important and significant discoveries every time a new Edition comes out.

In this Edition I have added the salient features of **Dholavira** —which is probably the most spectacular discovery of Indus Culture known in this century.

This find may some day drive us to seek a total and entire re-examination of our present knowledge of Indus Valley Civilization—but a thorough discussion has to wait until the excavation report of the site is made available.

In view of the extreme popularity that this work has earned in this short period I have asked the publisher to bring down the price for the students. This, I am certain, will enable every student to have an access to this volume.

16th JUNE, 1992

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CHAPTER I

Introduction

1. The Background

We inherit a featureless past but our inborn curiosity keeps seeking and constructing shapes from within this darkness. A tribal group, for instance, seeks its origin from a star or a mountain or even an animal in one place, while in another a folk-tale about its origin from the more probable human being may be present. That is, we attempt to explain ourselves or even our surroundings through our knowledge and perception at a given time.

One of the earliest such opinions or explanations is recorded from the second century BC Ssu-ma Chien, a Chinese court historian, had suggested that man had passed through four different stages of technology: A period of stones, another of jades and then of bronze before he finally entered the period of iron-making and with it the various associated techniques of cultural growth. It is, indeed, surprising to see how close he came to what is indicated from evidences known today. In a slightly later period Greek philosophers came out with similar reasonings regarding the birth of man and the process of his cultural growth. The spread of Christianity in Europe virtually brought about a complete end to these philosophical conjectures and opinions. The *book of genesis* slowly started becoming the main explanation of man and his culture. It was not only considered heretic to entertain any other view of life but there were strong punishments given to such 'pagans' and 'non-believers'. Even leading scientists of the period saw justification in Dr John Lightfoot's conclusion that the earth was created on October 23rd, 4004 BC at the civilized time of 9 a.m. (Dr Lightfoot was from Cambridge University and arrived at this conclusion on the basis of laborious research of genaeological calculations from Biblical sources in 1654). Geologists were the first to raise their doubts about such a young date ascribed to the origin of the earth. Incidents of accidental finds of inexplicable objects and the courage and conviction of some brave individuals soon started raising heads of doubts about this otherwise comfortable view. One such accident which later on was to lay down the foundation of prehistoric archaeology in Europe was recorded in Suffolk during a church construction. In a letter dated June 22, 1797, John Frere wrote to Rev John Brand, the secretary of an intellectual society in

London, his findings of several, "weapons" associated with "extra-ordinary bones". He even ventured to opine that "these weapons may tempt us to refer them to very remote period, indeed even beyond that of the present world". The **uniformitarianists** school came out with their explanations about the various strata found on the ground as the creations of geological events. Consequently a series of such events were identified and described.

With these the moral bindings of accepting Biblical explanations as the only explanation of our creation was slowly loosened. This helped the free expression of many thinkers. The lable **prehistory** was first employed by a French scholar named Tournal in 1833. In 1851 Putman used it more specifically to refer to a period beyond history. In 1853 Marcel de Serres suggested the term **Human Palaeontology** which extended human existence beyond the popularly held period. In 1856, in a Dusseldorf quarry, workers discovered the first remains of the **Neanderthal man** which was then explained as belonging to a modern race suffering from some disease (by a brilliant scientist Prof Rudolf Virchow of the University of Berlin). In 1859 came the rude blow to the entire group of conservative scientists. It was the publication of the **Origin of Species** by Charles Darwin. The shock that this most important contribution caused to the intellegentsia is best illustrated by the cartoons and editorials published in numerous copies of **Punch, The Honest** and **Harper's Bazar** in London during 1870-1876.

A french Customs official, Boucher de Perth, posted at Amiens along the river Somme had been making a fabulous collection of prehistoric stone tools from 1838; and by 1841 he had published five volumes to illustrate the point that these were prehistoric tools. Unfortunately he had to face fierce ridicules from the intellectuals until Darwin's brave theory led many to visit Amiens in order to re-examine Perth's huge collection and accept them as prehistoric tools.

In 1865, Lubbock in France divided man's prehistoric past into **Palaeolithic** and **Neolithic** periods. In 1868, the **Cro-Magnon** skeleton was discovered from the Les Eyzies and finally in 1891 a Health Officer in the Dutch colonial military forces for south-east Asia, Dr Eugene Dubois, discovered the *Pithecanthropus* in Java. This chain of events which was slowly breaking the Biblical hold on knowledge was successful in giving a scientific footing to our studies before the turn of the century.

Entirely independent from these events, the European colonizers in North America were trying to explain the mysterious presence of non-whites in this newly discovered land. Initially it was naturally sought to be explained on the

basis of the Biblical precepts. William Penn and some other writers explained that the American Indians are the descendants of the "lost tribes of Israel" Closer contact and keen observation, in course of time, gave rise to more logical reasonings about their origin. Some intellectuals among them reasoned that man has passed through some evolutionary changes in the past. The American Indians, it was argued, represent one of the earliest such stages of culture which migrated into the new world and remained stagnant as a result of isolation. William Robertson in his book, *History of America,* published in 1777 named some of these evolutionary stages. He was the first to coin the terms **Savagery, Barbarism** and **Civilization** to designate the evolutionary stages through which human society has passed. The ideas of Robertson were carried on with more objective description by Lewis Henery Morgan (1818-1881) and E B Tylor (1832-1917). Morgan, a lawyer, represented the Iroquois Indians in their legal battles against the land-grabbing white settlers. During this process he came close enough to these tribals which enabled him to produce a study of their culture. He published a treatise in 1851 and called this work the *"League of the Iroquois"*. Taylor's involvement with culture, on the other hand, occurred mainly because of his contact with the celebrated prehistorian Henry Christy. Intensive work with tribal groups in the later years enabled him to break the subjective connotation of the world **culture**. In 1871 he published his famous work *Primitive Culture* in which he categorically defined culture as a complex which includes knowledge, belief, art, morals, law and customs in any population irrespective of whether it is from the so called civilized West or from the pagan East or South.

Morgan studied more than one hundred societies during 1857 to 1871. Karl Marx and Friedrich Engels were working on the historic process of socio-cultural evolution in man during the same period and were deeply impressed by Morgan's work. Infact Marx and Engels felt that the conclusions arrived at from the study of the primitive societies by Morgan were quite congruent with those of their own modern societies.

The ethnographic studies on the one hand and the discovery of fossils and tools of early man on the other, led to the development of a prehistoric archaeology where the assumption had been that the tribals of today represent a culture which must be similar to some prehistoric culture. Naturally the areas of tribal concentration were thought to be unlikely to have a prehistory. Recent discoveries seem to show how biased these assumptions were. A site called Apollo-11 situated in the Huns mountains in south west Africa yielded a total of about seven stone slabs decorated with animal designs. It is believed that these finds could not be more than 6-7 thousand years younger than the

earliest west European Upper Palaeolithic art. Similarly evidences of Upper Palaeolithic man from Niah cave in Borneo, New Guinea Highlands and now from numerous sites along the coastal Australia can be taken to indicate the generalized presence of early man almost all over the planet, in a period as early as Upper Palaeolithic.

2. Prehistoric Archaeology

The study of antiquities belonging to periods before history is generally considered within the framework of Prehistoric archaeology. It will be apparent from the *background* provided above, that prehistoric archaeology originally developed as a part of culture history, but with more and more involvement of ethnographers from America the subject soon became the common ground for both historians and anthropologists. Besides these two broad subjects, many other natural and biological sciences keep constantly treading on its ground. It may be worthwhile, therefore, to define prehistoric archaeology at the outset. As a discipline it seeks to study the culture and society of man before the dawn of history. The specific questions that the archaeologists study are:

(i) The sequence of prehistoric occupation in an area

(ii) The origin and dispersion of a particular prehistoric population

(iii) The life styles of prehistoric peoples during a given period of time, and finally

(iv) The laws or axioms which governed the socio-cultural evolution of a prehistoric population.

The last two aspects in the study of prehistoric archaeology are rather recent in their development and were not the prime concern of archaeologists till the first half of this century. It is important at this juncture to note that history as a discipline does not have its own set of theories or law-like generalizations. Consequently, in prehistory till recently the tendency had been to emphasize the classification of archaeological finds and describing them. The introduction of the generalized theory of socio-cultural evolution has led the archaeologists to attempt explanations in order to erect fresh theories. Despite the rather precise set of 4 aims set out for the subject, the actual fields of activities of prehistorians can be extremely divergent. For instance, some study the primary occupation floors of early man in order to discern the stone fabricating activities, their techniques and finished types. There may be others whose concern is the environment and Pleistocene geology. There are some who

may be working mainly to understand food production and animal domestication. Many archaeologists interest themselves primarily in the understanding of early settlement patterns developing through urban civilizations, statehood formations or similar issues. Besides these, there may be yet another group of archaeologists who are entirely laboratory bound. They work on such problems as ancient metallurgy, firing of clay and combination of agencies or reagents to understand prehistoric techniques of ceramics, alloy formation, inlay work on beads or similar other cultural remains. This diversity of specializations has, by no means, diffused the basic aims of the subject. These specializations combine their respective results into the main enquiries of culture progression through time and space.

3. Culture

The word culture can mean a growth of bacteria, or cells in a test tube, or a specific way of behaving in a specific situation in a specific society, or even the cause for which parents seek prestigious schooling for their children. In anthropology as well, the meaning of the word has not been entirely unanimous. More than a dozen books are known to be in print, only shreading the word and the concept threadbare. However, a generally accepted meaning of the word may be attempted here. To most anthropologists *Culture is the sum total of the learned behaviour of man which evolves out of the need to adapt within a given environment.* **Culture is both adaptive and also the means of adaptation.** In short it is the artificially created buffer which envelopes man and through which man interacts with his environment. We inherit our biotic characters from our ancestors through genes, while such other things as our language or behavioral 'dos' and 'don'ts' are given to us through the process of socialization. That is, while we inherit the colour of skin or shape of face or similar other features from our parents through genetic transmission; we also inherit language, customs, avoidances and likings from our parents through extra-somatic means of transmission. These behavioral aspects that we inherit are grouped together as culture. Many other species of animals learn behaviors from their progenitors but no other animal can employ these behaviors for total adaptation within an environment. For instance bears and rabbits in the arctic have to develop heavy pelts through biological evolution. In man the need for such an evolution does not occur because he can culturally produce fur suit and igloo to protect himself from the environment. If these polar animals were to migrate to the tropics they would die until a series of genetic mutations can make them biologically equipped to cope with the tropical heat. Such mutations are a very slow

process and take generations. In other words, the chances of the polar bears adapting and hence surviving in a different climate are extremely low. Unlike these animals the man of the polar region needs to just change his culturally acquired kitt to adapt to a different climate. Although such a change will call for a series of adjustments in his other cultural components, yet his possibility of survival will be cent percent more than that of the animals. In other words we can lay down another law for culture: **Culture is uniquely human.** In the above example we have been talking of certain material objects as culture because these are devised by man as an extra somatic means of adaptation. Culture is not merely these material objects shaped by man but also a complex set of behaviors and behavioral sanctions which maintain, regulate and perpetuate the creation of such material objects. This array of habits, both material and non-material, are integrated within the social fabric of the community. This interrelated nature of culture is designated by the expression (that) **'Culture is patterned'**. A society is a group of interacting individuals. The interaction is based on the structure of the social organization. Culture is the ''fixed deposit'' within the society. That is, the society acts as the vehicle of culture, while the dominant social behavior of its members is determined by its culture. Like ''fixed deposit'' culture also accumulates changes and these changes, again, being related to the society bring about adjustment within the society. The progression or continuation of culture through time, therefore, requires the understanding of the mechanisms of culture change. The mechanism of culture progression is often referred to as **Culture process.**

Most of culture and its patterned structure is not retrievable for an archaeologist. It is only through the undestroyed remains of the past that actual culture is reconstructed. No one has ever heard about the digging out of a political system or a set of religious beliefs, yet reasonably clear and convincing political system of the early urban societies of the Middle-East or the religious structure of the Aztecs of Central Mexico have been archaeologically reconstructed. What the archaeologists recover are material objects which were created in the interaction of these behavioral systems. Tools, pots or fire hearths are all products of a culture and are hence linked in a systematic manner. Careful recording of all these along with their context and spatial spread is analysed in deductive logic in order to obtain information regarding the culture. The general laws which guide these deductions are obtained from unknown and surviving cultures. Here we may cite a few such laws to enable our understanding of the logic of archaeological deductions. If, in a society, all pottery pieces are identical in most of the attributes then such a society is taken to have a very centralized group of professionals producing the needs

of the society. In addition this can also be taken as an indication of an efficient distribution system. On the other hand, when a society has a large degree of individual variation in ceramics it can have only a nominal leadership the jurisdiction of which may at the most be applicable to settling disputes or organizing in case of defence or similar other ad hoc needs. Many such general laws are kept to guide the mute data of the archaeologist.

4. Concept of Culture

When Morgan was working on primitive contemporaries to establish his theory of unilinear socio-cultural evolution, some archaeologists like Heinrich Schliemann (1870), Grafton Elliot Smith (1911) and others were arguing that diffusion was the main cause of the spread of civilization. Such archaeological explanations did not make any dent in the popular anthropological theory for cultural evolution. In fact Morgan went at great length to qualify these stages in cultural evolution. For instance, the initial period of cultural evolution, called the lower stage of **Savagery,** was characterized by men living on fruits and nuts and without the knowledge of fire. This was followed by the next stage of savagery when men lived on fish and used fire. This scheme continued in seven such stages--the last one corresponding to the 19th century Europe. Soon it was felt that although Morgan had amassed enormous data on tribes, his evolutionary scheme was not adequately supported by empirical data. Further, it could not explain several cases of apparent de-evolution in the ethnographic records.

The chief opponent of Morgan's scheme was Franz Boas, who taught at Columbia University from 1896-1941. Boas emphasized the collection of historical data for every cultural element before one can put forward any law regarding culture change. In the urgency of gathering cultural history of tribals Boas had to push back the main cause of the data collection viz, evolving laws of culture changes. The Boasian emphasis on history of culture has led to designating his approach as **Historical particularism** by subsequent workers. This approach views culture as a conglomerate of traits coalesced and held by a population. This can result from either the group's own peculiar history or through contact. A major contribution of this period to archaeology was the increasing interest being paid to chronology so that variation in cultural remains could be arranged in correct sequence. The other major change in archaeology during this period is the increasing attention being paid to the artifacts themselves. That is, a complete description of the recovered artifacts was followed by grouping these into certain categories and

then tracing their origin, expansion or disappearance. Very soon it was realized that these archaeological studies have really little to do with the study of man. In 1948, Walter W Taylor, in his dissertation titled *"A Study of Archaeology"* successfully demonstrated how Boas's historical particularism when applied to archaeology ceases to be of any relevance to culture. The alternative suggested by Taylor can be recalled later on. Here it will be relevant to mention, very briefly, some of the important approaches to culture suggested during and after the time of Boas.

(i) Emile Durkheim (1858-1917) professionalized sociology in France and established the fundamental premises of the study of social functions which abundantly contributed to the functional approach in anthropology and sociology. Durkheim defined the function of a part as the contribution it makes for the satisfaction of a need of a society. Even society has a charter of needs. Various parts of society function in interdependence to fulfil the needs which are indispensable and necessary. Once the needs are fulfilled the society continues and perpetuates itself as an ordered arrangement of parts. Durkheim did not call this methodology either structural-functional or functionalism. For him the main goal of sociology was to advance a sociological explanation, stating what are the social causes of a particular phenomenon and what contribution does this sociological explanation makes to society. The propositions of Durkheim's study of social functions were developed further by a British social anthropologist, A R Radcliffe-Brown. The latter adopted Durkheim's perspectives but did not agree with the usage of the word 'need' because it has a biological and technological connotation. The word is substituted by a phrase "necessary conditions of existence". Durkheim's cogent writings centered around division of labour, the explanation of suicide rate and totemism. Consequently these works did not influence many archaeological analyses. However, some works appeared during the first two decades of the present century which endeavoured to combine functional model with a diffusionist one. The early writings of V Gordon Childe fall into this category.

(ii) Heinrich Schliemann (1860) and **Grafton Elliot Smith** (1911): Heinrich Schliemann demonstrated through his study of Troy and Mycenae that every society did not evolve into higher forms of achievements as is anticipated in the evolutionary theories of Lewis Morgan and Karl Marx. Many regional cultures with distinct technological status and forms of social organization could grow both in time and space. This analysis proved to be congenial for the emergence of diffusionism. Elliot Smith, earlier a professor of

anatomy in Government Medical School (Cairo) in 1900, was profoundly impressed by the prehistoric ruins of Egypt. He spent a decade making a detailed study of these remains and published *The Ancient Egyptians* (1911). In his diffusionist approach, he traced the origin of every cultural item of ancient civilizations to prehistoric Egypt. Cultural diffusion, which got an impetus from Smith, was followed in many archaeological and anthropological studies in later years. W J Perry was one of the closest disciples of Smith. A strong foundation of diffusionist approach was also a vehement criticism of evolutionism.

(iii) V Gordon Childe (1892-1957) came to Oxford from Australia to study comparative philology, but was so deeply impressed by Sir Arthur Evan's discoveries of the Minoan civilization that he began to study prehistory leaving linguistics altogether. He started identifying, classifying and chronologically ordering all the available cultural evidences in British museums. These data were commendably synthesized by him in *The Dawn of European Civilization* (1925). Childe adhered to the diffusionist approach but was considerably influenced by the Marxian writings. European prehistory till date, to a large extent, follows the generalized pattern of analysis used and popularized by Childe. There is no denial of the fact that cultures evolve and diffuse, but an overemphasis on any one of these would drive one into the dungeon of reductionism. Childe's work was an evidence in the moderation of these approaches. As a matter of fact, Childe's main contribution lies in defining cultures by their surviving and unperishable traits, viz, stone implements, ceramics or house forms. That is, how certain varieties of cultural attributes, when always occuring together, can be taken to reflect the 'modes of survival' of a population and how these units can be isolated to observe their distribution in time and space. He used 'evolution' and 'diffusion' in controlled and limited way for explaining the observed changes.

Gordon Childe's analysis is often called the technological theory of social change, which states that a change in technology would induce a change in other aspects of social life. According to him the world has so far witnessed three revolutions, viz, Neolithic revolution, Urban revolution and Industrial revolution. A change in the level of technology needed for food production in different historical epochs was responsible for changing the style of life, the nature of relations, the world views and the ethics of people.

(iv) Leslie A White (1948), an American anthropologist, influenced many of his students who in later years were to pioneer the studies of change in prehistoric archaeology. He espoused the 'energy model' according to which

every culture makes use of the amount and sources of energy available to it. The technological advancement of a culture and the total complexity of it is examined in terms of the energy harnessed per capita per individual in it. The primitive cultures and the process of evolution thereof was demonstrated in terms of this argument and the unilinear evolutionary model of Morgan and others was resurrected by him. Depth of demonstrative arguments and the analysis of the functioning and evolution of complex social systems in White's approach was readily acceptable to many archaeologists.

(v) Julian H Steward (1936), an anthropologist from Illinois, attributed ecology its optimum role in determining culture. Not that earlier scholars were unaware of the importance of ecology but he took lead in demonstrating the relation of certain aspects of culture with differing ecological constraints. In 1937 he studied the western Pueblo Indians and published the *Ecological aspects of south western society.* In 1955 he brought out his *magnus opus, Theory of Culture Change* wherein he developed a methodology for "determining regularities of form, function and process which recur cross-culturally among societies found in different cultural areas". Contrary to the unilinear evolution he prescribed a multilinear evolution of all cultures. Lewis Morgan and Leslie White had conceived of culture as a `layered cake' technology being at the bottom, social organization in the middle and ideology forming the top layer. Steward added environment to this cake and demonstrated how these three aspects of culture alter to accommodate slight environmental changes.

(vi) Bronislaw Malinowski (1944): The wave of Boasian anthropology, which saw its glory in United States, was opposed by a British Cultural Anthropologist, Malinowski. He conceived of culture as an integrated whole. It consists of parts which collectively satisfy the biological needs and other wants of an individual. Once the biological needs are fulfilled, new imperatives are created which, like the former, require satisfaction. Culture provides the mechanisms to attain an optimum level of satisfaction. Since the mechanism of satisfying these needs alludes to their function the perspective is called **functionalism**. Radcliffe-Brown later on demonstrated that functions also operate within a structured system and hence viewing culture within, what he called, a **Structure-function** frame will be more appropriate. This approach since then, has been extremely popular in British Anthropology.

(vii) Lewis R Binford (1965) was a student of Leslie White at Michigan University in 1960. This was a very fateful time for archaeology. Culture was

generally conceived as a system of inter-related parts. Mathematics provided the systemic analytical approach which fitted perfectly with the functional model of Malinowski. In 1965 Binford's famous article "Archaeological systematics and the study of cultural process" was published in *American Antiquity.* Binford proposed that archaeologist's data (artifact) can be divided under three sub-systems, viz **Technofacts, sociofacts** and **ideofacts**. The objects used to combat directly with the physical environment are *technofacts;* those used for social function are *sociofacts;* and the objects contributing to the ideological aspects are *ideofacts.* The interplay of these sub-systems becomes progressively complex with an increase of population and other activities in a system. Of these cultural sub-systems, one most directly concerned with exploitation of environment is technology. Hence it was assumed that technologydetermines the efficiency of a culture to a large extent. Social organization and ideological set up adjust themselves to the technological levels or strategies chosen in the community. It is held that any given technology has a corresponding social and ideological level. Briefly putting, this is the stand of the proponents of **Cultural Materialism.** It is clear that this view is not a novelty but had broadly been the basis of Karl Marx's analysis of cultural development. Gordon Childe had also elaborated the role of technology within a culture.

Culture Ecology is yet another approach to culture which emphasizes ecology as the overall regulator of the three sub-systems. The main argument of cultural ecologists is that no technological system exists in vacuum, but is rather an answer to the constraints of physical and social environments. Therefore, any change in these conditions is likely to be reflected in a corresponding adjustment in technology and eventually in the remainder of the sub-systems. Julian Steward, mentioned earlier, is usually linked with the working out of cultural ecology of primitive societies, though his basic hypothesis had been that of multilinear evolution of all cultures.

5. New Archaeology:

Many students of archaeology consider the New Archaeology to be something loaded with sophisticated statistics and therefore tend to avoid or even at times criticize it. In an oversimplified manner if we reduce everything done by a conservative archaeologist as mere techniques and combine these with anthropological enquiries we get New Archaeology. (I think the word **processual archaeology** used by some should be more appropriate because what was new in 1960-1970 has no justification of being still called new in 1989. The

term processual is used to indicate that it is the cultural process which is the main enquiry in this approach. The best term, of course, should be **Palaeoanthropology**).

The maturing of processual archaeology within the last decade is mainly due to four significant publications appearing between 1960-1967. Albert C Spaulding in 1960 published a paper titled "Statistical description and comparison of artifact assemblage" which opened the way of quantification in archaeology. Binford attempted his systemic model in 1965. Carl Hempel in 1966 published his book titled *"Philosophy of Natural Sciences"* which deals with the epistemological issues. The nature of general law and its relation with statements of explorations etc. seem to have profoundly helped in developing scientific level of explanation in archaeology. Finally James Deetz in 1967 published his work on *Human behavior and archaeological remains*. This work was to lay down the basic rules for deciding various attributes or attribute clusters in order to identify cultural behaviors. These works (added with Binford's strong personality) brought about a revolution in archaeology. In numerous papers, lectures and seminars Binford started advocating more rigorous scientific testing and developing research strategies based on hypotheses derived from general laws. In 1968 the Binfords (Sally & Lewis) published *New Perspectives in Archaeology* and demonstrated how greater rigor in data analysis in the new system brings forth much more relevant information than the earlier works. Soon William Longacre, Albert Spaulding, Stuart-Struever, Paul S Martin, James Hill and many others realized how "archaeologists, too, were confronted with the bewildering and perplexing fact of disparity between what (they) wanted to accomplish--an explanation of why cultures change--and what (they) were actually doing--histories of sites" (Paul S Martin, 1971, p 1-8).

As a final note it should be mentioned that there is already a split appearing from within the proponents of processual archaeology. One of the groups feels that formulation and testing of general laws of cultural behavior is their prime objective. They use statistical correlations and other sophisticated quantitative factors in Hempelian sense. Another group of them feels that these laws can not adequately explain living processes. To them system approach with feed back principles is more adequate a tool to deal with prehistory.

The difference in approach notwithstanding, Archaeology is certainly making progress towards laying scientific foundation for itself.

6. Social Evolution:

Does this mean that we have lost sight of the 'wood' in order to concentrate on a 'tree'? No, the broad views of the evolution of a society as laid down by Leslie White in the beginning and then re-discussed by Elman Service (1971) and Marshall Sahlins (1972) are still widely accepted. Ethnographic records of contemporary simple societies indicate that:

Bands are the most primitive form of human organizations. This is usually a loosely bound group of 25 to 60 people who are related by kinship ties. The group co-operates in hunting and gathering activities without any form of permanent leadership. Many a hunting and gathering population in the world are even today found to live in Band Societies. It is quite likely that man, from his early Palaeolithic emergence till the beginning of agriculture, may have lived in this form of society. Abundance or scarcity of resources as also the population density within an area, can often bring about drastic changes in the band formation. Smaller sub-bands spread over a larger area or many independent bands may shrink into a single band depending on the stress on resources. The ties of loyalties being not as rigorously defined in them as in agricultural communities, such changing structures do not create any significant tension within the group.

Tribes are the kind of larger organizations that generally characterize early agriculturists. In agricultural societies loyalty to the group is important because food production is a group effort and individuals must be ascertained of their share. This change in basic economy along with the sedentariness of such a group requires stronger organizational rules to avoid conflict and tension. This was achieved by grouping several families or bands into a clan. A clan is a group of several families who trace their origin to a common ancestor. These clans usually function in a democratic manner because all resources are jointly owned by the tribe as a whole and controlled mainly by members selected according to their seniority.

Chiefdoms are a complex form of tribal organization. Here the egalitarian principles had to be replaced by a ranked society, on demand of the society. There may be a variety of reasons on which a chiefdom is created. Increase of population, greater prosperity, invasion by other society or even the natural growth of charisma of members of a kin-group can lead to the group being re-structured in families with hierarchical order. The chief and his family enjoys great respect and

privilege and usually looks into the proper distribution of produce among the members of the society. The surplus is always kept at the disposal of the chief to create professional artisans who manufacture such things of need in the society as pots, wooden plough, beads, ornaments or similar items of need. Many early Bronze age societies in Europe may have lived in this kind of social organization.

State-Organized Societies take birth with the early city states. Usually in Chiefdoms the authority of the chief was guarded by spiritual ascriptions. In a state-organized society the ruling class is secular (although it can seek religious sanctions) and hence needs to be maintained by a full fledged managerial system, military system, justice system or even slave system. The first Mesopotamian city states were headed by religious leaders and perhaps many of the other city states also started with a strong spiritual sanction.

7. Archaeologists' way to culture:

The evidences recovered by an archaeologist for most of the part seem as remote from culture as a pencil is from education. Nobody can, however, deny that the presence of one can be taken as the reflection of the other. In the same way no matter how far-fetched the retrieved object might look from human culture, it cannot be denied that the object is a product of human activity. If the object repeats itself through time we can safely conclude that this is the product of a patterned behavior which has been passed on to subsequent generations. Consequently such objects are conventionally accepted as **cultural traits** in archaeology. This argument will become more convincing when we consider that man satisfies his needs by shaping his environment. These environmental objects shaped by him are cultural and become, at once, a simultaneous indicator of three very important features of the past.

(i) The cultural objects decide the kind of need man wanted to approach with them. Most of our needs being the result of our biological requirements interacting with the environment, an indirect indication of the environmental stress can be deducted from these objects.

(ii) The cultural objects reflect the technological status of the community.

(iii) Finally these are also indicative of the degree to which the environmental constraint was meant to be overcome by the society.

Besides being the vehicle of these important informations of the past, these

cultural objects are also cultural traits. That is, they represent only a particular way of satisfying a specific need which obviously is being culturally transmitted. Thus, artificially prepared environmental objects (called artifacts), when occur in identical form in repeated numbers, can be taken as qualifying the products of human culture. Deetz (1967) identifies human cultural behavior on four different levels and suggests the use of four different terms to represent the products of these four varieties of behavior. Here, the basic trait of analysis has to be first identified. Let us call it the **attribute.** Attributes can be combined by an individual to form an **artifact.** Naturally any patterning observed in attribute level is a result of behavior at individual level. When a group of individuals within a community combines several artifacts this group may be identified as the **subassemblage.** A sub-assemblage reflects the behaviour pattern of a group. Several sub-assemblages combine to form an **assemblage** which can be taken to reflect a community behavior pattern. Finally when several assemblages are combined for the entire society this large group may be called the **archaeological culture.** The specific qualification of a culture synthesized through archaeological methods is different from an ethnographer's culture. This is mainly because an archaeological culture is entirely devoid of informations regarding social organization which perpetuates the culture or the ideological sanctions which control its alternatives. Serious misconceptions and wrong interpretations can result when these archaeological cultures are treated as similar to ethnographic cultures. It is true that the archaeological cultures do behave, in many respects, as ethnographic cultures but this note of caution becomes doubly important specially for this reason.

In prehistory the ethnographic connotation of culture is aimed but the way to it is controlled by carefully defined attributes which form the basic units of the study. The antiquities retrieved through excavations are technologically and morphologically described and a language of *Types* is evolved in the same manner as the essential ten numbers of mathematics. That is, these types are attributes like 1, 2, 3, ...9 and 0 for prehistory. Each one of these digits is precisely defined, yet in combination are meant to convey a meaning which has nothing to do with their individual characters. Further, they can produce infinite number of combinations. All these combinations will have the common feature of having no more than the above ten digits. Defining of types has not always been an easy job for many prehistoric periods and ascribed probable functions of the objects have often tended to confuse the issue further. It is not unusual, therefore, to find scientists engaged in disputes over types for many periods and regions in prehistory. The term **tradition** has also

been borrowed from ethnography to designate the continuous occurrence of a group of types through time over a reasonably homogeneous space. Like archaeological cultures these traditions are safer to be designated as archaeological traditions. Several local traditions can be clubbed together for a large area and designated as archaeological culture. In terms of Deetz a sub-assemblage through time is a tradition and likewise an assemblage through time is an archaeological culture. This ascendence from the attribute or type to culture requires meticulous search for innovations or introduction of new forms. The causes for changes are subsequently worked out by examining the environmental remains or neighbouring cultures to establish if environmental change or external cultural contacts or both in combination can be responsible for such introductions of new types. Here again, more often that not, the tendency among scientists is to seek an external agency to explain a change. May be a better appreciation of the process in which a type is born within a group would be able to demonstrate in future that in most cases the ramifications within a culture are the inherent quality of every living group.

8. Typological Concept:

Archaeologists have long been concerned with the cultural reality of types. Chang (1967) had in fact squarely put the question "Is there a recognizable, logical and causal relationship between the physical properties and contexts of the artifacts and their relevance to the behavioral and cognitive system of the makers and users?" The crux of the problem lies in the question--*Are types inherent in the material culture* or are they imposed by the archaeologist for the purpose of analysis. In 1953 Spaulding described a method for discovering cultural types by statistical method. Ford (1954) takes the bull by the horn. He describes a hypothetical population--"the Gamma-gamma of the Island of Gamma situated in the curious sea of Zeta". He formulates an ethnographic situation and then demonstrates, how in spite of individual variations in the house types, there does occur a model pattern. In other words, the conclusion that cultural types are realities and not artificially imposed seems to be reasonably demonstrated. These show a model tendency which remains consistent although a range of deviations occurs to accomodate individual variations. Since ethnography shows a static state of culture which is otherwise a dynamic process, these cultural types and their variations become much more apparent when one is dealing with prehistoric archaeological situations.

In our observable world we are constantly classifying what we see. We do this by attributing certain descriptive meaning to certain symbolic words or

numbers. Thus, when a statement like this is made: *T-shirts are much more comfortable in such hot and humid climate as that of Madras,* we have chosen a symbolic expression for a top wear in males by the word *T-shirts*. The expression not only helps to classify the possible varieties of men's top wear but also includes a specific morphological and technological description of the object. In prehistory similar designating terms are constructed in order to organize and classify the object retrieved through excavation. Usually these terms have demonstrable historical meaning in terms of behavior pattern.

Archaeologists generally use two kinds of types. There is a group which is identified as **Natural types.** These include such functional names which were probably the purpose for which the prehistoric community made it. The assumption in this being that the prehistoric man who made it must have had a specific function in his mind and this function is glaringly apparent in the form. For instance, a knife or an arrow head or for that matter a projectile point could not have been made for any other function than what their names would suggest. These type names, therefore, can be designated as Natural Types. It is important to note that natural types are not usually relevant for stone age prehistoric assemblages, nor are they always free of risk in their application. This is mainly because imagination has a role in the creation of the function ascribed by the scientist. The other group of types which are more common in use are **cognitive types.** The assumption here is that the types are born/created according to mental template or idealized pattern mainly decided by the cultural heritage of the population in question. Since the creation of this is through human agency the specific details within them can not be expected to be the exact replica of each other. These minor details may not be the result of any conscious effort of the maker, yet to an archaeologist such details may be of importance to evaluate the process of change in a culture. Hence these are also referred to as **analytical types.**

Types, whether described on functional or cognitive basis, can be further differentiated in three ways viz *(i)* A formal type, *(ii)* A metrical type, or *(iii)* A technological type. A formal type is described on the basis of shape and form, a metrical type on the basis of specific metrical traits within the type and finally there can be possibility of isolating technological features to describe a type. It will be evident from the above that they can be identified simultaneously under all these three ways. For example the cognitive type called **Handaxe** can exist as an Acheulian handaxe on being described on the basis of shape and form (formal type), it can also be called a Cordiform handaxe on the basis of pre-defined metrical specifications (metrical type) and finally it can have such technological characters which might be specific

to an area and hence identified under a technique named after the area or site. That is, the handaxe can also be classified as a Vaal handaxe, meaning the use of the specific technique of slicing a handaxe thin by a terminal blow which was recorded in sites along Vaal Lake in East Africa. These three typological approaches are to be conceived at three different levels of analysis. Much confusion can arise if all these different criteria are applied simultaneously to evolve a primary typological spread of a given assemblage. It is needless to emphasize that the criteria of deciding type groups for a given level of analysis have to be of the same kind--may it be morphology or technology or metrical. In Palaeolithic prehistory, however, a combined approach is also possible. That is, instead of calling Handaxe as a type --*A Vaal Cordate* can be identified as the basic type unit. Such combination criteria can, of course, lead to the identification of an unmanageably large array of basic types and hence make archaeological analysis extremely cumbersome. Bordes (1961) recommended a typological list for Lower and Middle Palaeolithic by fruitfully combining morphology and technique of manufacture for primary level and then enunciating sub-types for each of the basic types on the basis of any available minor differences--may it be morphological, technological or metrical.

9. Evolution of Man

It is important to state at the outset that there are a fairly good number of people who are recently advocating the origin of man from as diverse a source as dinosaur on the one hand and life from other planets on the other. Those who had been following the organic evolution also are not in agreement about how this process gave rise to man and when. Scientists working through fossils felt that the separation of apes from the line which gave rise to man took place somewhere between 20-30 million years ago. Some molecular biologists, on the basis of the study of albumins, have recently shown that this bifurcation may have been as late as only 5 million years ago. The disagreements about human evolution are too many to be counted in a book of archaeology. We will, therefore, briefly describe the four stages through which human evolution has generally been accepted to have taken place.

Ramapithecus: 10-14 million years old geological layers have yielded some 40 teeth and some 15 fragments of jaws from India, Kenya, Pakistan, China and some other regions of the old world. Since no other parts of their body is known we have very little idea of their height or walking posture. The most important feature which led them to be our direct ancestors is extreme reduction of their canines and modification of the chewing teeth. These

evolutionary changes are impossible unless the hands have been reasonably free. Ramapithecus is, as such, believed to have already entered into the direction of specialization that leads to the human kind (hominization process). Evolutionary significance of freeing of the hand has to be understood at this juncture. Most of the physical anthropologists believe that a group of brachiating (living on tree branches and moving from branch to branch with special adaptation of the four limbs and the tail for gripping) arboreal apes had come down to ground for terrestrial living. The ground living required a different kind of adaptation, and it is believed freeing of the forelimbs is linked with adapting to ground living. Further, it is argued that the nuts and fruits growing on the ground being harder than those growing on the trees, these apes had to develop strong chewing apparatus. The long canines are not very useful for this purpose. In fact chewing requires a great deal of side to side or rotating motion of the jaws and the canines of the two jaws in the case of apes were often interlocked and hence were a great hinderance to this adaptation. It is quite likely that *Ramapithecus* represents one of the first steps of this adaptive process. Ground living did not only require the adaptation of the chewing apparatus but also combating with an entirely different set of dangers which were non-existent in tree life. It is believed that the culmination of all these pressing needs brought about a development of bipedalism. Walking erect made man lose the snout, freed his hands, balanced his head on the spinal column by developing the occipital lobe of the brain, and finally the ability to manipulate the hand to work with the environment. Thus, what was rather an insignificant event of leaving the tree life set off the chain of changes in these apes. By about 5 million years (from today) he was capable of breaking simple natural objects like tree branches or stones to use them for his defence and occasional offence. Meat eating, even if practised, was more often that not, limited to carcass eating from the leftovers of other predators. The recent discovery, of about 8 million year old primate skull, reported by Professor David Pilbeam indicates that *Sivapithecus,* which is much more complete than any previously known fossils of this period, is more closely related to orangutan and cannot be a human ancestor.

Australopithecus (africanus) was a light, gracile creature who stood a little more than 4 feet in height and walked erect with a curved back. This form was more suitably adapted to ground and survived during 4 million years to nearly a million years from today. His brain was larger than the present day chimpanzee although his teeth were still in the process of evolving. A group among them seem to specialize in a different diet and developed a barrel like trunk with an altogether robust built. These are identified as forming a separate

evolutionary specialization and are called *Australopithecus robustus*. Both these species became extinct before 1 million years.

Recent evidences from Africa have revealed big colonies of australopithecines with piles of eaten bones and numerous stone fragments. These evidences leave little doubt about their ability to shape some sharp borders by simple breaking of stones and using these sharp stones to cut animals. Most probably they still did not hunt but merely scavanged dead animals. There is increasing belief that the Australopithecus co-existed with another advanced variety of ape-men who formed the first member of the hominid bifurcation branch. The eastern rift valley in Africa continues northwards through the Ethiopian highlands. Don Johanson in 1973 discovered an almost 40 per cent complete skeleton from these deposits at Hadar. The deposits could be dated to over 3 million years and the skeleton was named *Lucy*. The find was undoubtedly one of the earliest Australopithecus species which may have been the first representative in the line of hominid bifurcation from *australopithecinae*. It was given the generic status of *Australopithecus afarensis*.

At Koobi Fora region around Lake Turkana another group of finds dating to 1.8 to 1.6 million years along with many tools and Australopithecus remains were described since late 1960s. In 1961, Louis Leakey had announced the discovery in Bed I, Olduvai Gorge of a more modern looking hominid, which he called *Homo habilis* or the hand using man. Thus, the earliest membership in the hominization process that had to be ascribed within our own genus was given to this fossil find. At Koobi Fora *Homo habilis* could be attributed with more of tool making ability on added evidence. In other words, the direct ancestor of *Homo erectus* had to be now considered as *Homo habilis* rather than Australopithecus, although wherever *habilis* is reported it is invariably accompanied by a large number of *Australopithecus boisei* finds. Further, it is important to note that there are specialists who would still like to group *habilis* with a somewhat advanced variety of the gracile *australopithecine*. The latter group of specialists, therefore, would find it not difficult to accept that tool fabrication and manipulation emerged within Australopithecus stage.

Homo erectus was much closer to man in looks. His head was more rounded and had a volume of nearly 1225 c.c. (modern man 1500 and apes 450-600 c.c.). He was nearly 5 ft in height and had strong bones. The earliest of them has been found from Lake Turkana in Kenya and dates around 1.5 million years. The original finds from Java *(Pithecanthropus)* and China were of

much younger date (200,000 to 400,000 years) and this demonstrates the long period through which they ruled the forests. *Erectus* was perfectly adapted to making varieties of stone tools--the *magnus opus* of their creation being the Handaxe. More than 60 species of animals have been found associated with these tools. These include elephants, rhinoceros, bears, horses and camels besides numerous smaller species. Sometimes in the long duration of their stay the *erectus* must have domesticated fire because we have evidences of hearths where they must have kept the fire alive. It is believed that big game hunting was possible mainly because of domestication of fire. Herds of these large mammals could be driven into swamps or driven off a cliff with the use of fire and once trapped they could be butchered.

Homo sapiens:

When and how these fairly well equipped *Homo erectus* evolved into a group of early *Homo sapiens* is difficult to demonstrate. The generally held view is that these early precursors of modern man might have evolved between 200,000 to 100,000 years ago in Africa, Europe and Asia. They show no specific or radical change in their life style because they are also found with the same handaxe tool kit of the *erectus*, albeit much more refined. Their physical features are, however, much changed with more strengthening of the chewing muscles and thus pulling out of the temporal lobes of the brain (above the ears). This added an array of additional brain faculties. All authorities agree that language must have already developed by the time of *erectus* evolution and therefore that early *sapiens* were equipped with everything that we are biologically endowed with.

Here we must pause to look into the impact of biological evolution on the life style of our ancestors during this period (600,000 to 100,000 years before). Standing erect required a modification of the pelvis which narrowed the birth canal. The growing brain box and the narrowing of the birth canal were two simultaneous evolutionary changes which interfered with each other in the birth of human child. Nature brought about a compromise in this conflict by allowing a baby to be born much before it develops its full brain size. This required lengthening the period of post natal dependence of the new born. Evolution had also taken away the phenomenon of estrus in this group sometimes during this period. This made the female sexually receptive all round the year. These two combined to make human group ties stronger and stabler. Whether an ideal family could develop during the early *Homo sapiens* period is difficult to prove but that they were able to organize in stable groups

is well demonstrated.

Neanderthals are believed to be a specialized branch of early human races which evolved from the *erectus* stage around 100,000 years ago and lived simultaneously with the early *sapiens* for nearly 65,000 years. That this race was a branch of the main line of evolution is believed mainly because his brain capacity evolved to a limit which exceeded that of modern man by 50-100 c.c. In spite of his large head his other physical characters remained fairly rugged. For instance, he had large cheek bones and a very prominent brow ridge curving over the eyes and connecting across the nose giving rise to a deep sunken appearance to the nose. These features were further accentuated by a rather broad nose which was perhaps an adaptation to cold climate. Coupled with these facial features, his thick set body with a slight bent and a height of 5 feet gave him a real demonic look. Why such a form had to evolve when the generalized trend in evolution was progressing in a different direction is evident from the fact that they were the first proto-human group who penetrated deep into the north arctic climate. In terms of their geographical spread also the Neanderthals excel all other contemporary or earlier forms.

Regarding the socio-cultural life the Neanderthals show some very interesting evidences. Their tool kit demonstrates a very specialized series of relatively more job specific flake tools which were successfully used in large game hunting. They are also the first among our ancestors who show evidence of pre-occupation with life after death. They buried their dead with food and tools laid along with the body. Another interesting evidence of their skill and emotion comes from the Shanidar cave in Iraq. Here a 30 year old man has been buried with flowers covering his body (the pollens of the flowers have been found and their possibility of having blown inside the cave eliminated by careful comparison). This is a sentiment not quite uncommon even today. This man had one of his arms successfully amputed during his lifetime. Many other Neanderthal burials are known with evidences of a religious cult connected with the cave bears. In one instance an arthritic old man is buried which clearly shows that even crippled people must have been adequately cared for by them. All these evidences qualify the Neanderthals as very close to us in their attitude and sentiments. Their physical ability and degree of environmental adaptation was also no less than what was required for a successful survival and yet this race became extinct by 35000 BC with the advent of modern man. A possible explanation given for abrupt extinction of Neanderthals is a direct confrontation or a bloody war between these two races. So far, we do not have many archaeological evidences to prove this

possibility but that they were eventually wiped out of this planet seems certain.

In the sequel it is important to mention that there are some indications of interbreeding between the Neanderthals and Modern man in the cave sites in Yugoslavia and Israel. It is quite likely that these intermixtures have finally given rise to the Upper Palaeolithic Modern man. *Home sapiens sapiens* or modern man appears rather in an abrupt manner in Europe around 36000 years ago. Right from the stage of its early appearance it shows rather strong internal heterogeneity of form. Many scholars believe that this heterogeneity may have finally given rise to the three main racial groups of modern man. One of the most talked of forms of this modern man was found from the rock shelter of Cro-magnon in France and he is often taken as the ancestor of the modern Europeans. The sites of occupation of this race of modern man are invariably very thick in their occupational debris, and this is taken to indicate a regular population growth among them. They not only migrated all over Europe but their habit of migrating seasonally with their prey made them enter lands which were not inhabited by our earlier ancestors. Thus, the peopling of the New World took place during this period. They must have also devised ways to float and navigate, otherwise they would not have been able to migrate to the Pacific Islands and finally to Australia. The isolated skull found from Niah cave from Borneo can be taken as a direct evidence of this migration to the south-east. There are, however, some very recent evidences coming up from both Australia and North America which shows that these migrations may have taken place in several waves and the earliest waves of migrants to the New World may have been some Neanderthal races and not modern man.

The modern man was not only adapting rapidly to various environmental conditions but his extreme mobility made him develop sharply different cultural habits in different parts of the world. Out of the most significant of his cultural achievements was his extreme preoccupation with visual art. He undertook great pains to draw and paint various figures and motives in hard rock walls, ceilings and floors. The motive of his art, by no means, can be taken as creations for mere visual pleasure because there are several enigmatic features about them which can be explained only at an esoteric level.

10. Race differenciation

Modern scientific researches have demonstrated that human adaptation within these widely varying environments must have already started the

genetic selection processes. For instance Vitamin-D synthesized from solar radiation is both essential as also lethal when taken in large doses. Higher exposure to sun could also be lethal and hence melanin (or the pigment causing chemical) of the skin is activated to protect the body from absorbing excessive Vitamin-D. That is, although all human beings have the same number of pigment producing cells (melanocytes), the rate of pigment production is differently programmed by genetic selection. In the same way mutation may have caused the sickling phenomenon of blood just in order to enable man to adjust within an area otherwise infested with malaria. We have very little possibility of knowing, through archaeological researches, how and when the various differentiating processes in man started. Nonetheless, it is generally believed that man's need to adapt to various kinds of environmental and cultural stresses faced during the Pleistocene period may have been the main cause of evolution and subsequent differentiation.

Corpolite or dried faeces of prehistoric man have been analysed to see the pattern of food man has been eating. Many interesting informations regarding his preferences of specific edible plants out of a large available variety (known through palynology) can be demonstrated through this study.

Similarly, palaeopathologists, through their study of skeletal remains, have demonstrated that arthritis was perhaps one of the most common ailments suffered by prehistoric people. For comparatively recent periods evidences of many other diseases, which leave a permanent mark on bones and teeth, have also been recorded.

CHAPTER II

Measuring Time

In many ancient societies time was never considered a measurable unit. To them if time was measurable one should be able to hold a basket full of time - the basket being the unit for measurement known to them. Measuring tangible objects must have been there since the prehistoric period, but time being not tangible requires a conceptualization first. In pre-literate societies one can often come across dating the age of an individual in reference to a memorable natural event. Ancient Egyptians and Babylonians are believed to be the earliest to attempt a calender on the basis of astronomical and climatic events. Most of these calenders and their method of construction are today in semi-obscurity but these attempts can demonstrate man's curiosity of calibrating the past into some comprehensible units. The calender is a product of our civilization which measures the past in such units as *years, month* and *days*. In dealing with prehistory such units are hopelessly useless and hence new units are required to be defined. The prehistoric units for the measurement of time are mainly in the form of a variety of climatic events of worldwide nature and hence these can never be as precise as our calendric units. One of the most important involvements of most prehistorians, therefore, lies in reconstructing the past climates of a given area and then correlating this with a broad successional sequence of worldwide events in order to pin the new area within a specific stage of this sequence. There are a large number of scientists working in various natural science disciplines to obtain a calender year estimate for these events or even to date given prehistoric objects. The dates obtained through these allied agencies and expressed in units of years are termed as **absolute** or **chronometric dates**. It is needless to emphasize how wrong this term is, because all such estimates are very tentative and have a large range of plus-minus errors in many cases. The rest of the approaches to dating give only indirect estimates called **relative dates.** We shall briefly enter into all these dating techniques just for a basic awareness of the beginner, because in most cases these principles and actual working are very much outside the area of interest of average prehistorians.

1. Relative dating:

(a) Stratigraphy: One of the simplest approaches to chronology is based on the principle that the lowest layer in any natural process of deposition is older than the ones above it (provided there has been no disturbance). The youngest phenomenon under the same logic will be represented by the topmost layer. The succession gets reversed if the depositional agency has the power of constantly getting lower in level through time. The classic example of this kind of stratigraphy is recorded in many river banks in the form of terraces. Thus, in a **terraced stratigraphy** it is often the topmost layer, or more correctly terrace, which is the oldest and the lowest layer the youngest.

(b) The Pleistocene: The Pleistocene is an epoch which forms a part of the Quarternary period which in turn is a part of the Cenozoic Era. Various other divisions of the era and the periods contained within it are given in every book of palaeontology but do not concern us in prehistoric archaeology. The Pleistocene epoch is the epoch within which man evolved in the form of *Australopithecus*. The beginning of this epoch is believed to lie anywhere between 5-4 million years from today and is defined in terms of the first appearance of some marker fossils. These are as a group called **Villafranchian flora and fauna** and include the ancestors of modern cow *(Bos)*, elephant *(Elephus)* and horse *(Equus)* on land and *Hyalinthica baltica* in sea. Most of the estimations done so far to fix date for this event (viz, to mark the beginning of Pleistocene) indicate Pleistocene epoch to have started around 5-4 million years ago and ended around 8,500 B.C. To every prehistorian this epoch is of extreme importance because just before its beginning *Ramapithecus* separated out to form a line of human evolution and throughout this period man passed through at least 4 broad evolutionary stages and minimum of about 12 different cultural stages. It is only after the Pleistocene ends that man starts domesticating plants and animals. Pleistocene epoch is marked by a rhythm of several glacial advances over Euro-Asia and the Americas. All these periods of glacial advances were not of equal intensity, neither were the intervening warm periods of the same type. Some scientists believe that during the height of these glaciations compact ice of 2000 to 3000 mt thickness stayed over the land for several hundred thousand years. The enormous amount of water trapped in the land borne ice caused severe lowering of the sea level exposing land bridge beetwen many Islands and their adjoining main lands. In many favourable coasts these ancient beaches have been found and named corresponding to the Alpine glacial order. The glaciations which decended down from the north pole accompanied glaciers of all

glaciated mountains gliding down to lower plains. In Europe the glaciers have been identified by giving them names of rivers on the Alps. There are several synonyms used for each of these names in different parts of Europe, Asia and Americas but to avoid complications we will use the Alpine names only.

		Glacial	Interglacial	
PLEISTOCENE	Upper	WURM		10,000 years BP
			Eemian	150,000 years BP
	Middle	RISS		
			Hoxnian	
		MINDEL		400,000 years BP
	Lower		Cromerian	
		GUNJ		
			Villafranchian	4 million years BP

The estimation of dates of 5 million to 500,000 years is done through a radio-active isotope disintegration technique known as Potassium - Argon method while dates upto 90,000 years are done by a similar method based on Carbon isotopes. The rest of the date lying between 500,000 years to 90,000 years are done through relative dating techniques and hence are very tentative. Before we go into these methods of dating it will be important to understand how the glacial/interglacial chromometer is applied in practice. A large number of plant types (described and defined through the identification of their pollens in soil) and animal types (described and defined through the identification of their skeletal remains in soils) specific to each of these climatic stages are established as a guideline. Any prehistoric site in which these indicators of environment are found associated along with the cultural debries, the dating becomes relatively easy by comparison of the latter with the established guideline. In many cases, in spite of these faunal (animal) and floral (plant) availability a precise date may not be easy to arrive at because the faunal and the floral types found may be the ones which show no change of form for a relatively large part of Pleistocene. In other words, what is taken as archaeologically more fortunate is the availability of what is called the **marker fossils.** Marker fossils are those which are known to change into different **species** or **sub-species** at known periods within the Pleistocene.

Thus, insects, reptiles, fish or even some forms of mammals are quite useless in ascertaining the specific period within Pleistocene. Certain sub-types of elephants and rhinoceros have been found quite useful because they have changed into 3-4 different sub-species during this period. When such marker fossils are not available archaeologist may try any method--from soil chemistry to methods of soil deposition--by air or rivers in order to link their find indirectly to one of the 7 broad stages in the above table. The actual process of obtaining a chronological status for a given deposit is in reality an extremely long one. Recently experts in palaeomagnetic reversals recorded the actual size of reversal of the north pole into south pole. In the last 3 million years the north pole of the earth seems to have become south pole 10 times and each of these reversals has been named and dated.

2. The tropical rivers and lakes:

Almost all rivers and lakes in the world are getting narrower and shallower because of the tons of debris that they have accumulated during the past. A series of stable periods have caused down cutting of the bed and eventually changing the course. Deposites brought by the river in the past have sometimes been found more than a kilometer away from the modern flow of the river in a terraced structure. Studies of these available terraces in African and Asian rivers demonstrate that tropical regions of the planet underwent an excessive rainfall period during the time glaciations were occurring in the temperate regions. During these heavy rainfall periods the rivers accumulated huge amount of debries which were eventually discharged when the water content dried up and could no longer carry them. Thus, a series of boulders or gravels are found in stratified deposites along the banks of all ancient rivers and lakes. The periods of high rainfall are called **pluviations** and the dry periods between two pluviations are called **inter-pluvials.** There are 4 such pluvial deposites found in East Africa and these pluvials are termed as **Kageran, Kamasian, Kanjeran** and **Gamblian.** Possibly these were occurring in the same general time period when Europe was recording the four glacials, ie, Kageran during Gunz, Kamasian during Mindel, Kanjeran during Riss and Gamblian during Wurm. Some parts of Africa record two more wet phases after Pleistocene and these are named **Makalian** and **Nakuran.** The evidences known till date seem to indicate that in India althogh there might have been as many wet phases as in Africa but most of the rivers were not born in the initial phases to record them. The earliest deposites recorded may not be older than the **Kamasian** in some rivers while in others it might have been even younger than this.

3. Fluorine dating

All bones and teeth are mainly composed of a phosphate named hydroxyapatite and the ground water in most places contains flourine. If, therefore, a bone is lying buried in the ground, the fluorine from the water is absorbed by the bone to form a stable chemical compound called fluorapatite. The amount of fluorapatite in a prehistoric sample of bones can, therefore, be taken to discard younger incorporations. Since many of the fossils of early man have been found washed up at the shore of water sources or simply on the surface, this method can atleast establish the relative antiquity of the finds.

4.Pollen dating or Palynology

Pollens are small grains released by different flowering plants. These have excellent preservative ability and are also different in structure for different genera or types of plants. Recovering the pollens from prehistoric soil can help reconstructing the plant life of the environment of that time. Since plants are extremely sensitive to the climate their relative proportion through a depth of stratigraphy can sometimes reveal the process of slow change of environment during the period of soil deposition. The relative proportion of large trees or arboreal plants (AP) and grass and bushes or non arboreal plants (NAP) has often been used as an index (AP/NAP X 100) to establish a tundra from a thick forest in many stratigraphic profiles.

5. Seriation

This is one of the most popular and useful methods of relative dating available for comparatively younger periods in Archaeology. Basically it involves identifying minor stylistic changes in a given type through a period of time. If the frequencies of people using a specific style in a given time are represented as horizontal bar and the frequencies of its use in successive periods are likewise arranged, then we observe the so called "battle ship" --i.e., there are very few people who start using the style on its emergence and slowly its popularity increases (the middle of the ship) and finally again the popularity decreases. If this series constructed for a given type has some absolute dates, then any surface collection within the area can be ascribed a date by comparing with this battleship design. Recently the method has been used with sophisticated statistics to attempt automatic arrangements of units into a series. Stylization in ceramics has been very successfully dated with this method.

6. Chronometric dating

This most widely used dating technique can be grouped as radio-isotopic methods, the theory of the most well known of these, called radiocardon technique, was first given in 1940. It is based on the fact that solar radiation striking the upper atmosphere converts a small amount of the atmospheric nitrogen into radioactive isotope-Carbon-14. Since all living organisms exchange gases with the atmosphere the amount of Carbon-14 in their cells soon reaches the same levels as in the environment. When the organism dies the trapped Carbon-14 in the cells begin to disintegrte back as nitrogen. Laboratory experiments have established that half of any amount ofCarbon-14 disintegrated in 5730 years (that is, its **half-life** is 5730 years). By measuring the amount of radioactive carbon left in a prehistoric organic remain one can calculate the time that has passed since its. death. This method can give reliable dates upto about 50,000 years after which the radioactive carbon left is too little to be measured.

Potassium-argon dating is based on the same principle but can be done only on rock or volcanic ash samples. It is because Potassium-40 is known to be constantly decaying into a gas called Argon-40. The **half life** of this disintegration is about 1.3 million years. Since Argon is a gas, it escapes when the rock is molten like in lava but gets trapped when it cools. This trapped amount can be measured from volcanic deposits. Most of our prehistoric sites cannot be dated by this method because they do not occur in volcanic ash and also because dates lesser than 500,000 years become unreliable. In other words, between 500,000 to 50,000 years i.e. the entire length of Middle Pleistocene and considerable part of Upper Pleistocene are not datable through any radiometric method.

Dendrochronology is another chronometric method of dating which is of limited applicability. The cambium lying between the wood and the bark forms rings during yearly growth period of a tree. It is a common experience to see these rings in trees cut across the trunk. These concentric rings maintain minute differences of structure for each year depending on the temperature, humidity and age of the tree. Certain trees, specially bristlecone pine (*Pinus aristata*) found in California has provided different ring structures for as many as 4,900 years. Each of these structures is plotted against their year of formation calculated from the outermost ring dated to the year of its cutting. Finally the prehistoric sample of unknown date is compared for its ring structures with the already identified structures. This technique has been successfully used in dating many Palaeo-Indian habitation sites. For most of

our prehistoric period this technique cannot be used simply because of lack of any surviving wooden sample. This technique has, however, played a very important role in correcting the earlier obtained radiocarbon dates. It was found that the assumption that every living organism all through the past had maintained the same amount of Carbon-14 in their cells, as a present day living organism does,was not entirely correct. Hence many radiocarbon dates showed younger values for older (real)dates. With bristlecone pine dates radiocarbon dates have been corrected for 1000 to 4000 years. All radiocarbon dates are written as BP (Before Present) which by an international agreement is meant to be before AD 1950.

Varve analysis is another chronometric dating technique used successfully in obtaining the age of some prehistoric events. It is based on the principle that glacial lakes have an increased amount of water in the summer than in the winter and therefore the thickness of the fine clay deposition in the lake will be more in summers than in winters. Physical counting of these darker varves or bands can lead one to estimate the age of the lake as also the time since its melting had started. This method has successfully demonstrated the exact time of the end of Pleistocene when the permanent ice covering most of Scandinavia started receeding. Prehistoric sites are seldom found by glacial lakes and hence this method has no direct utility in prehistoric culture datings.

Fission Track dating is based on the principle that uranium atoms decay by emitting alpha particles which causes fission track damage on the surface of the material. Volcanic glass or some other minerals known to contain uranium show these damages under microscope. If the total amount of uranium present in the sample and the density of the tracks can be counted the ratio between the two gives the age of the sample according to pre-determined constants for the rate of spontaneous decay. This method is still in its experimental stage and is applicable only on objects, having a glassy surface.

Thermoluminescence: Many materials including clay and stones can store energy by trapping electrons from impurities. This energy is stored until the material is heated. On heating, this energy is emitted as a glow and this is termed as thermoluminescence or simply TL glow. On cooling, the alpha particles are again absorbed by the material. The rate at which the energy is reabsorbed since last heating can be calculated in the laboratory. Thus, if a prehistoric ceramic sample can be energized to estimate the amount of alpha particles reabsorbed since it was last heated, period elapsed since its last use can be computed.

Obsidian hydration: Obsidian is black opaque glassy rock which is also

referred to as natural or volcanic glass. This stone has been abundantly used during recent prehistoric past. Whenever a fresh obsidian nodule is fractured, water from the environment starts getting absorbed in the newly exposed regions and forms the band of obsidian hydration layer. The rate of hydration formation can be determined in the laboratory under controlled conditions. The thickness of hydration layer found in prehistoric obsidian sample can then be converted into years by using the rate of hydration. This method is very easy and also cheap but can be used only on obsidian and hence is frightfully limited in its applicability.

Archaeomagnetic dating is another chronometric method of dating which is limited in its applicability to regions for which accurate data of earth's magnetic field and angle of Dip etc. are recorded for last several hundred years. Since such data are not available beyond 1600 AD its applicability to prehistory is ruled out. For Palaeo-Indian habitation sites, however, it has been fruitfully utilized. The technique is based on the principle that clay has impurities of ferric salts which are magnetic in nature. When a prehistoric fire hearth or kiln is heated its magnetic impurities develop earth's magnetic field for that region for that period. If magnetic data for the region through time are available a mere comparison can show in which year it was fired.

7. Some recently developed methods

Human bones contain several amino acids. When polarized light is thrown on them some of these rotate the light to the left while there are others which rotate the light to the right. The former types of amino acids are called l-isomers and the latter are called d-isomers. Most of the amino acids when found in living proteins are l-amino acids but when the organism dies these slowly change to the right rotating or d-isomers. This phenomenon is known as **racemization.** It was demonstrated that the racemization of a specific amino acid,called aspartic acid, takes place in the period between 5000 to 100,000 years. Many prehistoric bones are now being subjected to the identification of d-isomers of aspartic acid in order to estimate the date. There are some successful dates also availabe from this technique.

Another method proposed is to estimate the rate of patina formation in a kind of rock called lydianite and through this estimate the date of prehistoric debries in which these stones are present.

There are many other dating possibilities which are being constantly investigated in various laboratories but these researches are completely outside the arena of archaeological research.

8. (i) General Environment during Pleistocene:

It is true that the evidence of huge glaciers gliding over the land in Europe and America is demonstrative from the debries they have left behind, the effect of these ice sheets staying for sometimes, as long as 100,000 years, needs to be better understood.

It is believed that during at least the last two glaciations the climate of northern hemisphere was nearly four times colder than the present arctic region. Rocks and boulders pushed along the tip of the advancing glaciers made mounds along the tip of the limit where these glaciers stopped. Such deposites are called **moraines**. Moraines are studied by geologists to find out the path and extension of various past glacial episodes. The annual temperature during the peak glacial periods went as far down as -100°Cwhile during much of the interglacials the temperature did not rise beyond 0°C -- 10°C. During the stay of the ice the ground water was completely frozen (**permafrost**) and hence the water molten from the weight of ice could not get absorbed in the ground. This created an expanse of slush around the lip of the morains. Advancing glaciers furrow through undulating land surface and in the process discharge a great deal of dust in the air. This dust is carried by strong wind currents created due to the cooling of surface air. These wind borne dust particles are deposited all over. In the areas where glaciers could not reach because of intervening mountains, like in lower Austria, the airborne dust (called loess) is found deposited to great heights. These loess deposits often yield a very rich assemblage of faunal material. During interglacials it is not only the sea level that rose by more than 100 metres but in many places the landmass also got raised because of the release of the tremendous weight of ice. These fluctuations had considerable effect on the vegetation zones of the area. Studies show that the timber line had been swinging back and forth by sometimes as much as 10 degrees of latitudes.

In the tropical zones, effects of excessive rainfall are visible along the rivers and lakes but the environmental temperature was much lower than the winter today. As a result of this many of the plants and animals found in these zones seem to be tolerant in temperature fluctuations. Grassland and Savanna dominating the non-equitorial zones accommodated a large variety of animal types. The interpluvial dryness accompanied the temperature rise and spread of grassland and desert almost to the periphery of the equitorial regions. Active pluviation had again changed these regions into thick rain forests. The various climatic zones identified today are described below with their envi-

ronmental characteristics. For reconstructing prehistoric climate the understanding of the characteristics of these present day zones comes quite handy.

Tundra: It is a vegetational condition which is negatively defined. That is, it refers to areas where no vegetation grows. There can be two different kind of tundras, the one which is found in the polar regions and at high altitudes in the temperature zone, and the other in the deserts. Both are caused by lack of water in the soil. In cold tundra the soil water is frozen and hence can not sustain any plant life while in deserts there is no usuable water in the soil. Discontinuous mosses, sedges or lichens in the polar tundras and shrubs of xerophytes in the desert tundras are the usually occurring vegetations. One can perceive several sub-zones of the Tundra on decreasing climatic severity. Such terms as HERBACEOUS TUNDRA or even TRANSITIONAL FOREST-TUNDRA are used to designate such shades or climatic variation.

Steppe: It is a term used to designate grass-land environment. Seasonal moisture maintains very long grasses and other herbaceous plants over large stretches of land over the mid-latitudes, i.e. 30° to 40°N and 30° to 40° S. These occur in areas where winter temperature reaches very low limits for more than 4 months in a year, where exceptionally low temperature is maintained over a long period of time-as long as 4 months at a time. The summer and spring precipitation is not enough to maintain arboreal (plant) life. As such, thick clods of grass with the network of their roots spreading far and wide, come into their own. These roots are destroyed during winter and subsequently putrified to provide nutrition for the growth of plants next spring. Steppe land can develop both in the periphery of the tropical forests as also in Tundra. Thus if forms a specific kind of gradation of both the extreme forms of vegetational regimes.

Tropical Forest or Tropical Rain Forest: This is a term used to designate an extreme form of vegetational regime. It constitutes a thick growth of hygrophytic, evergreen, broad-leaved vegetation. Several layers of trees grow in succession with their canopies reaching in height many times the mark of 50 metres. The distance between the trees can also get reduced thereby, sometimes to as little as a meter. Lianas and climbers occur in profusion where grass or any other kind of undergrowth is virtually absent. Normally this kind of vegetational zone occurs between 10° N to 10°S where humidity constantly remains above 90 percent all round the year. In South-East Asia the Rain Forest extends almost upto 20° N. Whenever this kind of forest develops a gap in its overhead canopy (because of the soil conditions below), sun light

penetrates it right upto the ground and a dense undergrowth takes birth. Regions where the rainfall is not uniform and comparatively drier summers occur, the Rain Forest starts growing deciduous vegetation and trees and soon a mixed forest results.

Savanna: This is a term used to indicate a transition from a proper Rain Forest to a Steppe gradation. Grasslands interspersed with isolated trees of both the evergreen and the deciduous variety occur in this kind of a climatic zone. This is a characteristic feature of the vegetation found all over the sub-humid tropics. Lighter tropophytic plants are the commonly found constituent of these forests. This is also referred to as the **Parkland phase** in some countries. Usually regions maintaining rains continuously for more than 6 months in a year develop this form of ecology. It is believed that more and more of the Tropical Rain Forests of the world are fast metamorphosing into Savanna in their characteristics because of their overexploitation by man.

The identification of all stratigraphic units in a given deposit necessitates thorough investigation of the soil and its gradation. Frost weathering (cryoclastism), particularly evidenced in the soil sediments in caves and rock-shelters, is indicated by laminated and angular chunks layed over soft soil. Such deposits are often referred to as **eboulis** or **talus** in archaeological literature. Weathering of a sediment during wet phase is identified from the amount of carbonate that is leached through the soil. The length and severity of the wet phase, naturally, can be attempted by quantitative chemical analysis of the soil. A special kind of *in situ* weathering of rocks in the tropical countries called **laterization**, may be described at this juncture. This is a process by which the clay minerals of the rock are broken down during excessive rain thus enriching the weathered surface with minerals. These minerals are later crusted by a process of irreversible crystalization. Laterites are rich in iron oxides and are brick red in colour. Forested rocks around the tropics are known to have lateritic deposites well over 10 meters in thickness. Seasonal rains wash these oxides of iron and deposit them along the lower valley drainages. These secondary deposits of laterites are called detritus laterites or simply **detritus.**

The agency which causes a soil deposition is identified through sedimentological studies. The deposits caused by permanent course of water flow (river) are called **alluvial** or **fluvial** deposits. The ones caused by lakes are called **laccustrine** deposites. The ones caused by wind are called **aeolian** deposits. Finally those caused by advancing glacials are termed **morains.** The degree and duration of these agencies at a given place is often attempted

through grading of the soil samples from these deposits. Various soil grading standards are being followed in various labs. Here we may give an example from one standard:

Blocks	100 - 10 mm in diameter
Granules	10 - 5 mm in diameter
Gravels	5 - 2 mm in diameter
Sand	2 - 0.5 mm in diameter
Silt	0.5 - 0.002 mm in diameter
Clay	0.002 mm or less in diameter

"If 100 gms of soil from any deposit is estimated for these gradations and expressed in percentages, any deposit caused by a forceful agency will tend to incorporate very high percentage by weight of the larger components while lesser the force the finer the particles will become. Such sedimentological graphs, when drawn through time, can indicate how the climatic phenonmenon controlling the agency has fluctuated in the past. These climatic fluctuations are then established by faunal and floral analysis. Hence an extreme dry and hot period between two extreme wet and humid periods can be easily diagnosed on the basis of sedimentology. The temperature fluctuation if present for a long enough period of time can be more easily understood from the vegetable and animal remains. A combined interpretation of climate of a period through a multipronged analysis of a given deposition leads to defining stratigraphic units.

The changing climate of Pleistocene is also marked by changes in the fauna and flora in various parts of the world. While the flora has either to adapt to or perish with adverse changes in the climate, the fauna in many instances survived by migrating to regions of milder climatic stresses. In cases of long periods of climatic changes evidences of fauna also having adapted to the changed situation may not be entirely unknown. Pollen-grains studies (Palynology) from deposits in north-west Europe show that early Pleistocene supported *Azoila tegeliensis, Tsuga, Najas intermedia, Pterocarya limburgensis, Trapa natans* and *Coreva intermedia*. These floral forms are usually referred to as **Tiglian** after the Tegelen clay in Limburg in Netherlands where they were identified. The subsequent warmer phases see the evolution of *Microtus* and *Mimomys*. The *Azolla feliculoides, Corylus* and *Abies* are introduced successively. The last interglacial is marked by high proportion of hazel and horn bean in Europe. *Betula pubesceus, Populus tremula, Pinus*

sylvestris and *Alder* are the other floral types that characterize this phase.

The identification of a flora involves the analysis of pollens or microscopic investigation of charcoal remains. Usually Palaeobotanists are specially trained for this kind of work. The percentage of each *genus* and *species* of plant is computed from the total of the pollens in a given sample. Finally what is known as the "pollen spectrum" of the deposit is constructed. For ecological interpretations certain groups of the plant types are made, such as "hydrophailus" and "heliophilous" plants. A high percentage of the former group will undoubtedly indicate a wet environment. A predominance of the heliophilous group of plants, on the other hand, will indicate sunny open spaces. Similarly, the proportion of arboreal plants (AP) to non-arboreal plants (NAP) in a given specimen can indicate a grassy steppe (high NAP) or forested environment (high AP) during the past periods.

The faunal finds from each of these periods help in fuller understanding of early man's environment. The Villafranchian stage in Europe is marked by such large mammel forms as *Elephas meridionalis, Dicerorhinus etruscus, Equus stenonnis* and *Trogentherium cuvieri*. Of these *Elephas* and *Dicerorhinus* show important evolutionary changes during the Pleistocene and thus act as two extremely helpful markers in archaeological datings. *Elephas (Archidiskoden) meridionalis* in Europe and *Elphas A . planiforns* in Asia are found till Cromerian faunal stage beginning from the early stages of the **Villafranchian.** By the beginning of the Mindel glaciation these early elephants give rise to straight-tusked *Elephas palaeoloxidon antiquus.* These straight tusked elephants survived till Wurm. The *Mammuthus trogontherii* seems to be another variant evolved from the ancestral *Elephas meridionalis.* From an ancestral form of mammoth also developed the *Elephas mammuthus primigenius.* It is found in Riss and disappears in Wurm.

Similarly, *Dicerorhinus megarhinus* and *Dicerorhinus etruscus* of the Villafranchian stage are found to survive upto the middle of Mindel in Europe. It gives rise to the *Dicerorhinus kirchbergensis* (merckii) and *D. hemiotechus* in the subsequent period. These two forms continue to occur till the early phase of Wurm. During the height of Mindel glaciation the Woolly rhinoceros (*Coelodonta tichorhinus antiquitatis*) evolved somewhere outside Europe and migrated in every peak glacial phase. Besides these large mammals European Upper Pleistocene witnessed the emergence of such forms as *Megaceros giganteus, Hippopotamus amphibius major, Equus, Caballus silvestris, Ovibos maschatus, Felis leospelaeus, Rangifer tarandus, Bison*

priscus, Cervus elaphus and many other well known modern animals.

Faunal and floral analysis can help to reconstruct past environment to a large extent. Certain animals can thrive in certain kinds of habitat. They also maintain symbiotic relationship with a set of other animals within the same habitat. Further, a certain kind of temperature, moisture and soil alone can provide the specific vegetation pattern for maintaining this animal population. Most geochronological ascriptions are, therefore, entirely dependent on researches on these diverse branches of knowledge (geology, botany, zoology). We not only measure time on the basis of establishing climatic succession but we also learn a great deal about past environment with which our ancestors interacted.

CHAPTER III

Prehistoric Techniques and Types

Man started his cultural career on a very adhoc attempt to obtain a sharp cutting edge. His loss of canines and powerful nails through evolution made it necessary to seek environmental help. Evidences show that this adhoc beginning had slowly taken a grip on him. He not only standardized working with a given raw material from his environment but slowly experimented with different raw materials. Thus,newer techniques had to be evolved at every stage. The need of a sharp edge was also being slowly replaced by a variety of other needs. The history of man's cultural progression is basically a history of his technological progress. Cultural terms such as **Stone** age, **Copper** age and **Iron** age are also essentially attempts to divide cultural traits within a definable technological stage.

1. Earliest or Palaeolithic

Man must have begun his experiment with his environment with wood as a raw material. This must have been the easiest retrievable raw material available in the form of branches of trees in the open forests but evidences of that stage are destroyed for ever and hence cannot form the part of any archaeological investigation. Stones are the other raw material which came quite useful to man. He found it so suitable for his needs that he continued using it for nearly a million years adding some ivory and antler only at the fag end of this period. Even after he developed techniques of metal retrieving he did not entirely give up his age old love for and habit of stone. The techniques in which these stones have been shaped by him are usually reconstructed by controlled experiments by the archaeologist himself. These experiments can result into a fuller understanding of stone fabricating techniques. Here we can summarize some important features of stone technology.

When a given stone needs to be broken with another stone, the hammer stone needs to be bigger in mass than the piece to be broken. Further, choosing a harder raw material for this purpose can also serve the purpose. For instance, for flaking flint or quartzite, granite, basalt, dolorite or similar rocks used as hammer stones can be quite useful. In case of non-availability of harder rocks the stone to be flaked can often be broken by dropping it on ground and then

the smaller pieces picked up to shape into tools. When a piece of rock is chipped at convenient corners (**flaking**) and then used, the pieces of stones knocked off are waste flakes and the tool is a **core tool.** When the reverse is the case, that is, when the piece of stone merely acts as the source of producing flakes and these flakes are further shaped (by **retouchings**) then the shaped pieces are called **flake tools** while the core is a waste. It is obvious that in the case of a core tool the length of sharp border obtained is extremely low in relation to the energy spent on it, whereas in case of a flake tool the same energy can produce 10 to 20 times more sharp border. Thus, in terms of efficiency a culture dominated by flake tools can be taken as more advanced than another containing only core tools. Identification of a flake tool can not be done by mere size as there can be cores smaller than large flakes. Here archaeologists take the use of what is known as the **positive bulb of percussion.** It has been noted that when force enters a stone it imprints an elevated bulb on the inner surface of the flake right under the point where the hammer hits it. The surface on which the hammer hits a stone is called the **striking platform** and the point on the platform, where the hammer hits, is called the **point of impact.** The surface on which the positive bulb appears is called the **bulbar scar** or flake **scar of detachment.** The corresponding area on the core is called **flake scar.** This flake scar on the core maintains a deep point corresponding to the positive bulb and this is called the **negative bulb of percussion.** Since a large flake can always become core in relation to the next flake removed from it, the usage of the terms core and flake becomes relative. Since relative terms are useless in scientific analysis, a flake in archaeology is decided to be any piece of stone which maintains a positive bulb of percussion no matter (a) how small or big it is and also (b) no matter how many flakes may have been removed from this. The surface of the stone which bears no evidence of human workmanship is called **original cortex.** Such a surface, in case of a pebble, is much more apparent than on chunks and boulders naturally derived from hills. Finally we need to introduce the term **retouchings** in a more specific way. Retouchings are medium to small sized chips removed in a contiguous manner along a border. These differ from flakings in only the purpose. While flakings are aimed at removing stone material, that is, to thin out or obtain a slope, retouchings are aimed at regularizing a border or strengthening it. Any unworked stone flake has razor-sharp borders but these borders are damaged easily. The angle formed by the two surfaces at a sharp natural border can be as low as 7°-10°. Retouching increases this angle to as much as 20 ° - 30 °. The difference of the functional edges in the above two cases is like the same of a safety razor blade from a sturdy pocket knife.

2. Primary fabrication techniques

(a) Direct percussion: This was the most common method adopted by prehistoric man. In this the stone hammer hits the stone in a swinging blow. Maximum amount of force enters the stone in a rather uncontrolled manner. It results in a great deal of shattering effect. The bulb is pronounced and has a fairly large outer circumference. Sometimes this technique is also referred to as **free flaking** technique.

(b) Block-on-Block: In this technique the pebble or block of stone to be worked is struck against the projecting point of a large fixed stone or envil. The bulbs produced in this kind of flaking can be really pronounced as the force with which the stone hits the anvil is supplemented by the natural weight of the rock.

The above methods have a risk of having no control over the fracture and hence can often defeat the purpose. The following controlled manners of stone fabrication were evolved to overcome this risk.

(c) Step or resolved flaking: As the name signifies the flake scars produced by this technique are shaped like a step. Here the hammer directs the force inside the thicker part of the stone in contradistinction to force directed outwards in the case of free flaking technique. This restricts the force from travelling over the entire thickness of the stone and as such the force gets spent up after travelling half way through. As a result of this a crack develops on the surface of the stone along the periphery of the termination of the force. This results in a vertical cleavage on the surface as also a horizontal scar (when seen from top). It has a chiselling effect which enables cutting the borders without sacrificing the thickness.

(d) Cylinder hammer or hollow hammer technique: Tools with unusually shallow and elongated flake scars were discovered in prehistoric debris. Dr Leakey after experimenting with many kinds of hammers declared that such flakings could only be effected by using a hollow bone or antler or a wooden hammer. On the face of it this method might appear to be improbable, but only experimentation can demonstrate how good flakes can be removed by this technique. The greatest advantage of using these organic hammers is their property of absorbing the reaction of force--thus totally eliminating the shattering effect of impact. The bulb produced in this kind of scars is diffused and the flake scars have a more or less parallel running boundary ridge.

Besides the above two, there are two other controlled flaking techniques

the smaller pieces picked up to shape into tools. When a piece of rock is chipped at convenient corners (**flaking**) and then used, the pieces of stones knocked off are waste flakes and the tool is a **core tool.** When the reverse is the case, that is, when the piece of stone merely acts as the source of producing flakes and these flakes are further shaped (by **retouchings**) then the shaped pieces are called **flake tools** while the core is a waste. It is obvious that in the case of a core tool the length of sharp border obtained is extremely low in relation to the energy spent on it, whereas in case of a flake tool the same energy can produce 10 to 20 times more sharp border. Thus, in terms of efficiency a culture dominated by flake tools can be taken as more advanced than another containing only core tools. Identification of a flake tool can not be done by mere size as there can be cores smaller than large flakes. Here archaeologists take the use of what is known as the **positive bulb of percussion.** It has been noted that when force enters a stone it imprints an elevated bulb on the inner surface of the flake right under the point where the hammer hits it. The surface on which the hammer hits a stone is called the **striking platform** and the point on the platform, where the hammer hits, is called the **point of impact.** The surface on which the positive bulb appears is called the **bulbar scar** or flake **scar of detachment.** The corresponding area on the core is called **flake scar.** This flake scar on the core maintains a deep point corresponding to the positive bulb and this is called the **negative bulb of percussion.** Since a large flake can always become core in relation to the next flake removed from it, the usage of the terms core and flake becomes relative. Since relative terms are useless in scientific analysis, a flake in archaeology is decided to be any piece of stone which maintains a positive bulb of percussion no matter (a) how small or big it is and also (b) no matter how many flakes may have been removed from this. The surface of the stone which bears no evidence of human workmanship is called **original cortex.** Such a surface, in case of a pebble, is much more apparent than on chunks and boulders naturally derived from hills. Finally we need to introduce the term **retouchings** in a more specific way. Retouchings are medium to small sized chips removed in a contiguous manner along a border. These differ from flakings in only the purpose. While flakings are aimed at removing stone material, that is, to thin out or obtain a slope, retouchings are aimed at regularizing a border or strengthening it. Any unworked stone flake has razor-sharp borders but these borders are damaged easily. The angle formed by the two surfaces at a sharp natural border can be as low as 7°-10°. Retouching increases this angle to as much as 20 ° - 30 °. The difference of the functional edges in the above two cases is like the same of a safety razor blade from a sturdy pocket knife.

2. Primary fabrication techniques

(a) Direct percussion: This was the most common method adopted by prehistoric man. In this the stone hammer hits the stone in a swinging blow. Maximum amount of force enters the stone in a rather uncontrolled manner. It results in a great deal of shattering effect. The bulb is pronounced and has a fairly large outer circumference. Sometimes this technique is also referred to as **free flaking** technique.

(b) Block-on-Block: In this technique the pebble or block of stone to be worked is struck against the projecting point of a large fixed stone or envil. The bulbs produced in this kind of flaking can be really pronounced as the force with which the stone hits the anvil is supplemented by the natural weight of the rock.

The above methods have a risk of having no control over the fracture and hence can often defeat the purpose. The following controlled manners of stone fabrication were evolved to overcome this risk.

(c) Step or resolved flaking: As the name signifies the flake scars produced by this technique are shaped like a step. Here the hammer directs the force inside the thicker part of the stone in contradistinction to force directed outwards in the case of free flaking technique. This restricts the force from travelling over the entire thickness of the stone and as such the force gets spent up after travelling half way through. As a result of this a crack develops on the surface of the stone along the periphery of the termination of the force. This results in a vertical cleavage on the surface as also a horizontal scar (when seen from top). It has a chiselling effect which enables cutting the borders without sacrificing the thickness.

(d) Cylinder hammer or hollow hammer technique: Tools with unusually shallow and elongated flake scars were discovered in prehistoric debris. Dr Leakey after experimenting with many kinds of hammers declared that such flakings could only be effected by using a hollow bone or antler or a wooden hammer. On the face of it this method might appear to be improbable, but only experimentation can demonstrate how good flakes can be removed by this technique. The greatest advantage of using these organic hammers is their property of absorbing the reaction of force--thus totally eliminating the shattering effect of impact. The bulb produced in this kind of scars is diffused and the flake scars have a more or less parallel running boundary ridge.

Besides the above two, there are two other controlled flaking techniques

which are usually employed for finer tools.

Punching technique: It involves the use of an intermediate puncher which receives the blow on its top and transfers it to the core through the other end. Such a method has the advantage of controlling both the magnitude and direction of the force by manipulating the puncher by one hand while the force is being delivered by the other. The *peckings* in Neolithic celt preparation are done by this process. This method is quite useful in knocking off undesired corners or protruberances on a rock surface without the risk of undesired damage to the tool.

Pressure flaking: Some Palaeolithic tools like the upper Solutrean points carry fine shallow flakings on the surface and these were taken to have been produced by what is described as pressure flaking technique. In this technique the media (puncher) transmitting the force keeps in contact with the core during the process the force is in action. This prevents radiation of the force waves in radial direction at the point of impact (In most of the percussion techniques the hammer swings off after imparting the force on the core. Left to itself, the force, therefore, tends to radiate in the direction of the blow. The fan shaped flakes detached in free flaking technique are a good example to demonstrate this point). As a result, pressure flaking technique is quite suitable in the removal of elongated blades. Usually it is used for delicate retouchings but in blade manufacture it is one of the essential steps of fabrication.

3. Compound techniques

One or more of the above methods of primary fabrication of tools can be used to give rise to the combined methods. Here are some of the combined methods described.

Clactonian flaking: Strictly speaking this method is not a combined method but we list it here because it involves a special planning. This is the oldest flaking technique known from the British Lower Palaeolithic. The name is derived from the site Clacton-on-Sea in Essex. These flakes are known from all over Europe during various stages of Palaeolithic culture. These are essentially typified by a characteristic high flake angle and a general absence of secondary retouchings on them.

It is a common experience that to detach a flake from a pebble one has to strike a blow in an inclined manner. The angle of this direction of force with the pebble surface is therefore always less than 90° for obtaining a good size

flake. For removing a second flake from the same surface one requires increasing the angle of the blow. If this process is repeated a stage comes when the blow delivered is at right angles--and the core in this case, shatters in several pieces instead of giving a flake. Hence this is known as the **critical angle of percussion.** The Clactonian technique eliminates this limitation of simple percussion technique. Here once a flake is removed from one surface this flaked surface is used as the striking platform to remove another fresh flake from the opposite surface. As a result the flake angle of each Clactonian flake comes out as more than 90°.

Levallois technique: This technique is named after a site of this name in the suburb of Paris. It involves taking out of a number of flakes from one face of a nodule from all around its periphery in a centripetal manner as a first step. This prepared core resembles a tortoise shell and therefore is usually referred to as **tortoise core.** Finally a calculated blow is delivered on the top of the shaped surface in such a manner that a flake comes out of this core. The detached flake carries the previous dressing on its dorsal surface. It is, therefore, taken to be a technique where a previous planning and shaping of a flake to be detached is perfected. In other words this marks a technological development in prehistoric techniques which needs to be counted in the assessment of the characteristics of a given industry or culture. For long it has been emphasized that the diagnostic trait for the identification of a levallois flake is the occurrence of a facetted butt. In reality there are many normal flakes known with facetted butts and also numerous levallois flakes known without any kind of facetting present at their butt ends. The only feature which goes to define a levallois flake is the occurrence of centrally directed flake scars on its dorsal surface. Many or some of these dorsal surface flake scars do not have their points of impact on this flake (that is, the flake detached cuts a portion of the previous dressing from the tortoise core. Thus, most of the points of impact of these scars are retained on the core while the flake detached maintains only the distal ends of these scars). Besides this, the butt end of a levallois flake is rarely known to have formed an angle of more than 90° with the axis of the flake scar. Levallois technique can be modified by choosing and shaping special cores and thus producing levallois points and levallois blades.

Fluting: The technique of Mesolithic blade production is broadly termed as fluting. This term literally means the semi-cylindrical vertical grooves in pillars. And since a fluted core resembles such pillars the technique is termed fluting. The technique involves the preparation of a core as the first step. Here usual percussion technique is used to transform any nodule or natural pebble

into a prismatic shape. A striking platform is prepared at the end of the long axis of this prismatic core. The core is then held firmly on the ground and pressure is delivered from the edge of the striking platform. The pressure can be applied by using a pointed bone, antler or even specially prepared wood. In what manner this process was executed will perhaps never be known, but archaeological evidences offer enough proof of a complete perfection of the technique having been mastered by the people, and also that these blades were removed in rapid succession. The main points of distinction between Palaeolithic blades and Mesolithic blades are as follows:

(a) Palaeolithic blades produced by direct or indirect percussion always maintain a pronounced bulb of percussion. The platform is thick and often maintains a slight overhang. Ripples of force are seldom present near the bulb but never any fissures of force along the length of the scar.

(b) As contrast to the Upper Palaeolithic blades the Mesolithic blades are smaller and produced by pressure flaking technique. Pressure being constantly in touch with the core, the bulb of percussion can never be pronounced. Usually it is as tiny as a pin-head. The platform in these blades need not be thick as the point of impact and direction of the force is totally under control. Finally, often these blades bear numerous ripples and fissures along their scar of detachment.

The identification of the fluting technique can not be mainly based on these features as these are not always true for all kinds of raw materials. Hence the presence of the characteristic fluted cores alone can demonstrate the presence of this technique. In flint, for instance, it is demonstrated by actual experiments that pressure flaking can not remove a blade more than 2 cm in length. This has lead many authorities to attempt results of pressure flaking variety by punching technique. Prof Francois Bordes has produced beautiful 'laurel leafs' -- sometimes as big as 17 cm -- by merely using punching technique. It is, however, true that none of these flake scars (produced by percussion) bears those numerous ripples of force that the original laurel leaves have.

Microliths: The flaking techniques described above may have formed the main basis of tool fabrication for nearly one million years of our prehistoric past. The microlithic technique shares more or less the same features except that the main emphasis in this period shifts to blade manufacture by fluting. These blades are basically different from Palaeolithic flakes in the fundamental feature of having too much built-in sharp borders. Therefore, retouching in this period mainly aims at blunting an already sharp border. This, as a

technique, was evolved as early as 26 thousand years before the Microlith makers reemployed it. In early Perigordian or Chatelperronean blunting of an available border by steep or abrupt retouchings was first evolved. In entire Upper Palaeolithic this technique survives in various degrees and by the time Mesolithic culture starts it is adopted as the predominant retouching technique. Microliths are found to occur from almost 10,000 B.P. and continue to occur well within Christian era in many countries. These may or may not be found with later cultures (like Neolithic, Chalcolithic etc) as well. These are not used individually as tools. These were mounted in multiple numbers on suitable shafts to be used as tools. Obviously the emphasis has been the lightness of the finished implement and this explains the preference for tiny shapes specially when compared with tools of the earlier cultures.

4. Polishing and Grinding: Stone age implements have all along been flaked and retouched in various techniques to suit a function. In the last of the stone ages i.e. in Neolithic period an altogether different finishing technique is evolved. This is clearly demonstrative of an altogether new functional adaptation. All available evidences indicate that man had just evolved agricultural economy and he had to clear a great deal of bushes and trees to obtain open cultivation land. The new techniques of grinding and polishing may have been result of this imperative.

To suit this change in the purpose and hence technique, the raw material of the Neolithic tools is also changed. Quartzite or flint are no longer found suitable. A much finer grained and harder igneous rock such as dyke besalt, dolerite and epidiorite become the most commonly favoured raw material. It would appear quite evident that the Neolithic people not only had gathered wide practical knowledge about various rocks and their properties but had skillfully querried two or three different varieties of rocks to shape different tools. That is, while chalcedony continued to be used to prepare microliths (to be used as composite tools) dolerite was mined out specially to prepare the heavy axes. Quartzite is also continued to be used but now mainly for making ring-stones or bolas. There are many Neolithic sites where all these varieties of raw materials and techniques occur together.

A stone axe in the Neolithic period is prepared by taking a normal chunk of this special rock and then flaking it with stone hammer to obtain the shape that has been planned. Often the original surfaces of the core are used to advantage in order to decide the shape. The nature of the stone is such that unlike the result of stone hammer technique on quartzite the flaking removes only small

and shallow flakes. Once the shape is achieved the intersection of all the scars or any other generalized undulations left on the surface is carefully knocked off with a pointed hammer. This process is called **pecking.** Finally the finished tool is rubbed over a rough stone surface with water thrown in. Usually the working border is ground but in many cases the entire body of the tool can also be ground. Many authorities believe that some kind of fat may have been used during the final rubbing stage in order to give a polish to the finished type and hence the name **grinding and polishing.** Many Neolithic occupations have yielded large concave sand stone slabs with marks of deep grooves along the length. These finds further demonstrate the manner of execution of this technique. Using fat to polish, however, seems very unlikely because rubbing is not effective with a film of fat which lessens friction. It is, therefore, quite likely that the actual technique consists of **flaking, pecking** and **grinding** only. The unusual polish seen in some Neolithic axes may have been developed by prolonged use of these axes.

Ring stones and **bolas** are the other examples of the use of friction put to maximum advantage by the Neolithic people. These heavy quartzite pieces have been given a smooth shape by skillful pecking and grinding and then a hole has been driven through this by devising a drilling technique. Sometimes these holes can be as big as 8 cms in depth and 8 cms or even more in diameter. It is difficult to imagine how these holes were made unless we entertain the possibility of the use of a special drill with shell or choral stone inlay. That this kind of a drill could not have been operated by bare hands is also likely but to prove the existence of a bow-drill for this stage is also impossible. The holes in these ring-stones have an hour-glass cross-section and this can be taken to indicate that the hole was made from both the surfaces in order to meet at the centre.

Preparation of pottery with specially treated clay was another prehistoric innovation seen during the Neolithic period. We shall go into the basic characters of ceramic technology and the subsequently arriving metal technologies along with the description of cultures in the later chapters. Here we shall get to know some of the prehistoric types.

In earlier chapters we have gone at length into the philosophy of types in prehistory. Therefore, it need be specially emphasized that the enunciated types are universal and any local variations observed can be always accommodated as a variant within a generalized definition of one of these types.

5. Palaeolithic Types: Palaeolithic period has been mainly divided into Lower, middle and Upper on the basis of certain predominant types. We shall lay down the definition of these types below:

(i) Chopper: These are core tools prepared by unifacial flaking of the terminal end. In some rare cases the flaking might extend over one of the surfaces but do not include the butt-end which is as a rule kept untouched. A chopper can have a U shape or even circular appearance and hence the working end can range from a straight and transverse border to almost a semi-circular border. If the two terminals of the working border are joined by a straight line the maximum thickness of a chopper usually falls posterior to this line (towards the butt-end). If, however, the maximum thickness lies anterior to this line it is advisable to consider such a specimen as a flake core.

(ii) Chopping tool: It is merely a variation of the chopper with the only exception that here the flaking is done from both the surfaces. That is, the terminal flakings are alternately removed by altering the surface facing the worker. As a result of this the working end of a chopping tool is jagged or wavy as contrast to the sharp border of a chopper. Here also the shift of the maximum thickness towards the working border can be taken to include them as flake cores.

Both Chopper and Chopping tools are usually prepared by primary flakings alone. These are delivered by stone hammer with a swinging blow or using block-on-block technique. In some special cases some secondary flakings may also be present. But if over and above primary and secondary flakings there is evidence of contiguous retouchings along the border these should be considered as **Core Scrapers.**

(iii) Handaxe: It is perhaps one of the earliest tool types identified in prehistory. The main distinguishing feature of this type is that it is extensively retouched on both the faces and hence the name **Biface** is also used for this type. It distinguishes itself from other bifacial implements in the fact that with a few exceptions (e.g. Ovate) it has a thicker and broader end called the butt-end and opposite this occurs the narrower and thinner end called the working end, and the two surfaces and the lateral borders are so flaked as to meet at the working end. By implication biface is a core tool, but if all these characters of a biface are satisfied in a given specimen and over and above this a small portion of the **scar of detachment** with its positive bulb of percussion is retained then such a specimen can be easily designated with a prefix qualifying the difference. That is, this specimen should be called a **flake-**

handaxe. On the basis of their shapes the handaxes can be classified into a dozen varieties. For instance the elongated types of handaxes include **Lanceolate, Micoquian** and **Ficron.** The medium size squat group includes **Triangular, Sub-triangular** and **Cordiform.** Similarly ovoid group with rounded working end includes **Amygdaloid, Ovoid** and **Limande.** Besides these, there are some other types also identified but these are more or less area specific. Technologically and hence culturally these groups are not always associated. For instance, a lower Acheulian or Abbevillian handaxe can be **Lanceolate** or **Ficron** but seldom a Cordiform. Similarly an upper Acheulian can be Micoquian or Cordiform or Limande without any regard to the size. It is, therefore, important to remember that these categories are morphological with some technological rider alone and it is not safe to consider any of these types as specific for a cultural stage. It may be, therefore, worthwhile to attempt at some cultural terms for the handaxe.

Abbevillian handaxe: These are the largest of all handaxes known in prehistory and often weigh as much as 2-4 lbs. Although bifacially worked, these handaxes have scooping deep scars which give rise to very sinuous lateral borders. There are rarely any secondary flakings done along the borders. Usually these specimens are not quite symmetrical.

Acheulian handaxe: These are smaller and more symmetrical in their dorso-ventral contour. There are numerous secondary retouchings done and these are mainly concentrated around the lateral borders. Around middle Acheulian period cylinder hammer technique is profusedly used to execute the final shaping. In many upper Acheulian handaxes the sharp lateral border continues over the butt-end as well. A special shape of these handaxes is an Ovate which may have a twisted S or Z shaped lateral border.

(iv) **Cleaver:** It is ordinarily a handaxe with a transverse working end. This transverse edge can be obtained by retouching from both the surfaces and also by skillfully designing the intersection of a sloping flat scar with another similar scar or a retouched or original surface on the opposite face. The most common cleavers which come from Africa and India are made on thick medium sized flakes where the ventral surface has a single flake scar of detachment and the dorsal surface has a sloping scar towards the anterior end. Extensive flakings along both the lateral borders and the butt-end attempt to drive a suitable shape. Since this flaking is alternately done, the tool has a characteristic parallelogram cross-section. According to the shape of the butt-end cleavers can be classified as either U or V shaped. The working end, likewise, can be classified as transverse, left-oblique, right-oblique or divergent according to the position and nature of the bit.

Most of these four types of tools discussed here are generally heavy duty multipurpose tools. In their manipulation, a grip involving the palm of the hand is effective.

These are mostly found associated with the earliest group of human culture and hence they are taken as defining what will be called the **Lower Palaeolithic** Culture.

The following eight types, including their sub-types and also at times with a mixture of some of the earlier described types define the cultural stage called Middle Palaeolithic. This is a period which is of shortest duration and hence can be truely considered as a period of transition from Lower Palaeolithic to Upper Palaeolithic.

1. Scraper: The actual name of this type is **Side Scraper** but most of the non-European writings still use the term singly. That is, unless otherwise qualified as **End Scrapers,** *Scraper* will mean a Side Scraper. This forms the most common of all flake tools known from the entire Lower to Middle Palaeolithic period. There are as many as 21 sub-types identified within the side scrapers. These are based on slight techno-morphological variations. A side scraper is a flake tool in which one or more lateral borders are shaped by contiguous retouchings. If this retouching is done in 'fish-scale' manner such side scrapers are also referred to as Quina scrapers. (Fish scale is a special manner of retouching in which a series of tiny steps appear as ripples).

2. End Scraper: This is a tool type in which the scraping border is at the morphological end of the sepcimen and also the retouchings on the border are steeper than in side scrapers. In Lower and Middle Palaeolithic it occurs in simple form of an end retouched specimen while in Upper Palaeolithic it takes a specific shape. The Upper Palaeolithic end scrapers are prepared on thick blades the terminal ends of which are retouched at a high angle. At least 15 sub-types within this category have been identified.

3. Point: Points in prehistory are often a misunderstood type. There may be many broken flakes or blades which have very convenient workable pointed ends (and may indeed, have been used as a point) but such specimens cannot be included into the type **Point** until they show evidence of deliberate reinforcement on them. These are triangular flakes in which one of the angles is acute and show reinforcement around the apex. In some special cases retouchings may be done along only one border while the other border has a

natural fracture. Mousterian point is a very special form of this type known from only some specific areas. The speciality of these points lies in their symmetrical finish with almost all round retouchings.

4. Borer: This is a type which, like end scraper, is more of an Upper Palaeolithic character. In Lower and Middle Palaeolithic it occurs in generalized forms. It is a type in which a thick projected end of a flake is specially obtained by etching out two (ideally) notches at the base. In many cases tremoving of even one notch can serve the purpose.

5. Backed Knife: This is a Lower and Middle Palaeolithic knife which needs to be differentiated from the Upper Palaeolithic knife blades which are also backed. These are specific flakes which are so removed that they have three surfaces (i.e. in cross-section these tools are triangular) of which two surfaces are tranchet and converge to form an elongated sharp border running along the length of the flake. These two surfaces and the border created by them never have any retouchings. The surface opposite the border may be flaked to form a sort of backing. In many cases even this surface is composed of the natural cortex. That is, it is a tool type of planning and may carry no evidence of any further working on it.

6. Notch and Denticulate: These are two different types named entirely structurally. Although all types are structurally defined but the names used to designate them have remained functional just to keep in conformity with earlier literature. Seen in this regard these types appear both comfortable and also uncomfortable for perception. Comfortable because the name indicates the techno-morphology of the specimen. A notch is any specimen with a deliberate lateral incurve while a denticulate is any specimen in which more than one notch is prepared along a border. We feel uncomfortable because unlike a 'Knife' or a 'Scraper' these type names do not appear relevant in our understanding of culture. It is important, therefore, to re-emphasize that types do not attempt to describe a culture. It is that fixed morphological description which helps to identify cultures or culture boundaries from within a complicated spread of activities and their left overs.

7. Foliate or Blattspitzen: Back to types again, this is a thin bifacially worked point which is entirely prepared by controlled percussion technique. These points can be differentiated from the leaf points (**laurel leaf, willow leaf**) in the generalized crudeness of finish in the first place. Secondly, leaf points are prepared by pressure flaking technique in such a manner that the thinning of the body and regularizing the working border are both achieved

by the same series of flakes. In Blattspitzen, these are done by separate flakes and hence a large number of tiny step flakings are required in the control of the flakings.

8. Burin: This is again an Upper Palaeolithic type but may be known in atypical forms from as early as late Lower Palaeolithic. Burin can be prepared on a flake, blade or even on a core. The working end is exactly comparable to the same of a screw driver. This 0.5 to 1 cm transverse cutting edge is obtained by the intersection of **two plains** which meet at an **angle.** Hence these are also called **dyhedral angle burins.** The two plains are called burin facets and the manner of their preparation decides the sub-type of the burin.

The types that discriminate the Upper Palaeolithic are all prepared on blades. These blades can be retouched in order to reinforce a border or blunt it in order to obtain desired results. Given below are some of the typical Upper Palaeolithic types and the traditions that these types define.

Aurignacian

1. Retouched Blade: These are moderately broad, thick and long blades retouched in semi-abrupt retouches. The retouchings extend all around the borders including the terminal ends. In a typical Aurignacian blade the retouching is in the manner of fish scale. In some instances two notches are made on the centre of the blade along the opposite lateral borders. These blades are termed **Strangled blades.** A similar kind of retouchings done on a smaller and slender blade characterize Aurignacian industries known around the Correze valley in south west France. These are called **Font-Yves points** after the name of the type site. In the same valley another type prepared on a bladelet by semi-abrupt retouching is quite common. These are called **Dufour bladelets.** A Dufour bladelet is a slender bladelet of 2-4 cm in length in which one lateral border is retouched from the dorsal surface and the other from the ventral surface. Both these borders have semi-abrupt retouchings.

2. Aurignacian burin: This cultural tradition is also characterized by the occurrence of a specific variety of burin. Here one of the facets forming the burin edge is made convex by preparing a notch on the lateral border. This makes the area of the surface lying above the notch weak. Hence any oblique blow delivered on the top traverses a curved path in order to emerge from the weak region. This results in a convex fracture. The other facet which intersects with this plain is simple and vertical. These búrins are called **Basque burins.** Another variety of burins quite common in Aurignacian tradition is called the **axial** or **symmetrical burin.** In French this burin is also referred

to as **Bec-de-flute** burin. This is prepared at the distal end of a thick blade in such a way that the burin edge lies symmetrically along the mid-axis of the blade. It is believed that this can be achieved by holding the (would be) working end at the corner of a fixed anvil and then hitting the rear end of the blade. This results in the removal of a vertical **spall** (flakes removed to obtain a burin facet). Thus, the process repeated can produce two such vertical spalls which intersect to form the burin edge.

3. Aurignacian End Scraper: These are end scrapers prepared on thick but small nodules and found in association with blade and scrapers in many west European Aurignacian sites.A medium sized core is taken and a large flake is removed from it to form a flat under surface. Calculated tapping blows are delivered around the periphery of this flat surface to result in a series of flake scars meeting at the apex of the pyramidical obverse. The special appearance of these scrapers led them being termed **Carinated end scrapers.** If carinated end scrapers are so designed that the scraping end projects out in the form of a nose, such a type is known as nose end scraper. This is achieved by delivering one or a pair of notches on the side of the working border.

The above three types along with several variations of an **ivory lance point** form the main features of almost all Aurignacians.

Perigordian

1. Blade Knive: In Perigordian industries broad flat blades have been retouched to form several kinds of knives and these by far form the most frequent typology all through this stage and the subsequent cultural traditions. In the initial stages they are few and far between and constitute of abrupt retouching of one naturally obtained sharp edge of a broad and flat blade while the opposite border acts as the knife edge. In the later stages they are made on rather thick blades with triangular cross-section in such a way that the blunting is done upto the thick mid rib. As a result these become narrowed in appearance. Further, these backed blades show deliberate attempt at deriving a pointed distal end with flat ventral surface retouchings. These latter types, as such, are no longer called knives but points.

Audi Knife is one of the earliest of these backed blade types. This is a rather short and broad blade where one border is blunted towards the distal end in a slanted or semi-circular manner to meet the naturally-sharp working edge.

Chattelperronean Knife: Sonneville-Bordes calls it a knife point because here the blade is rather elongated and the backing is done completely along

one border in such a way that it gently curves down to meet the working edge at the anterior end. Usually even the base of these blades is rounded off by extending the abrupt lateral retouchings.

Gravettian Point: These are thick blades where bold backing along one or both the borders (often from both the surfaces) renders the breadth of the blade to almost half so that the backed ends meet anteriorly at an acute angle. The ventral surface around the pointed end also shows some flat retouchings done in order to narrow down the thickness of the point.

Shouldered blade tools: (Perigordian to Magdalenian): Many Gravettian points show a single shoulder prepared at the butt end and along the border opposite the backed border. Most of these backed points show minor retouchings on both the borders and the ventral surface of the working end. A typical type under this category is called **Font-Robert Point.** This is a Gravettian point with two shallow notches at the base which gives rise to a rather elongated shoulder and a broad tang.

During the Solutrean tradition similar shouldered points are recorded with shallow pressure flaking retouches. These are prepared on moderately broad blades with triangular cross-section in which the rippled pressure flaking retouches cover one half of the breadth of the blade (usually upto the median ridge) with a single shoulder prepared. These are termed as the **Solutrean plane faced shouldered points.**

Another variety of shouldered points is identified in the Magdalenian period. These are likewise termed **Magdalenian shouldered point.** These are smaller than the Solutrean points and have a shoulder prepared almost at one third distance from the pointed lip. The tang, therefore, is both elongated (almost two third of the total length) and also broad.

2. Hamburgian Point: This is a moderately broad blade in which one border is so backed that the anterior half slopes to give rise to a point while the posterior half slopes in a concave fashion to form the tang. Occasionally the backing at the butt-end may be extended a little along the second border as well. This tool type is very common in the north European flat land during late Pleistocene period. It is named after a similar site found near the city of Hamburg in W. Germany.

3. Ahrensburgian Point: The same area during the closing phase of Pleistocene yielded a series of Epi-Palaeolithic industries of which Ahrensburg is a famous site. Here the points are double shouldered as a rule,(besides carrying

the backing along one sloping border) to from the pointed end.

4. Kostienki Point: This is a type named after an Upper Palaeolithic site by the river Don in European Russia. The tool in ideal form is made on a blade with a convex sharp border (suitable to obtain on bladish flakes). The point is derived by backing the opposite border which may be slightly slanting. Flat flakings on both dorsal and ventral surfaces are removed from the pointed and the butt-end with an aim to make the point and the butt more effective. A shoulder is etched out by either straight or slightly incurved backing of the same border from around half or more length of the blade.

5. Truncated Blade: This is a tool type which is taken as the type fossil of Perigordian-Vb in France. As the name indicates this is any blade or bladelet the shorter ends of which are blunted with steep and abrupt retouch. In addition to these the lateral borders as well may be given the same blunting treatment.

6. Solutrean Leaf Point: These are exceptionally thin and flat points which show the zenith of stone tool manufacturing technology. Their moderately long and proportionately broad shape coupled with the extreme thinness gives them the appearance of characteristic laurel leaves and hence the name. The surfaces of the tool are covered with shallow and elongated flakings originating from both the borders and meeting along the mid-axis. These flakings show a characteristic ripple like appearance which is taken to interpret a very controlled pressure flaking technique having been employed. Prof Bordes, however, had demonstrated that almost similar effect can be produced (in much lesser time) by the percussion flaking as well. These tools can be double or single points and also can be unifacial as also bifacial. These are found restricted only in the Southern industries from southwest France and some isolated regions of northern Spain.

Laurel Leaf: This by definition is a bifacial leaf point which may be double or single. This type is described only from Upper Solutrean layers. In some Spanish Solutrean layers the borders of these points are characteristically serrated.

Willow Leaf: This is usually unifacial and occurs a little later than Laurel leaves in French Upper Solutrean. The ventral surface is a flat flake scar which may contain a little flaking at the pointed region to reinforce the sharpness. These points are usually shorter and narrower than average laurel leaf and are also shouldered in many instances.

Szeletian Leaf point These are bifacially retouched leaf shaped pieces which

by and large lack the fineness of French Solutrean retouchings. Like Central European **Blattspitzen** these also often carry patches of flat original surface though the final shape of these pieces and their relative thickness often compare with the Solutrean leaf points.

6. Mesolithic Types

We have already mentioned that the tools belonging to the Mesolithic period are all prepared on micro-blades produced by fluting technique. These are tools which could not have been used simply by hand. There are some evidences known from Greece, Norway, Sweden and Denmark which demonstrate that these tiny stone specimens were merely elements which in combination were hafted on wooden or bone handles to be finally used as implements. Such finished types as spear heads, arrow heads, sickles, knives, daggers and similar other weapons could be easily planned by using these microliths in several forms of combinations.

In Indian prehistoric contents, however, most of these microliths occur without their original compositive context except at Mehrgarh. Therefore, the typologies for these are purely structural in description like the earlier periods. To identify a microlithic type one needs only to specify the area of retouch on the **blades**--the basic tool bank of this period. When a blade has parallel ridges along its dorsal surface its own borders are also as a rule parallel. This kind of blade is called a parallel sided or simply **P S blade.** In contradistinction to these there may be some blades with series of bilateral flakings seen on the dorsal surface. These flake scars run horizontally to meet along a ridge. It is believed that this ridge was specially obtained by these transverse scars in order to guide the length of a blade to be removed and also to form a suitable bed for blade removal. Such blades, even though they have parallel borders, are called **Crest Guiding blades.** Many other thick but short blades with triangular cross-section are known to occur in every microlithic assemblage. These are of no regular shape and are grouped as either **Core trimming blades** or **Core trimming flakes** depending on their elongation,(i.e., $L \geq 2B$). There is a more or less universally agreed recommendation to designate all blades having length equal to or less than 5 cm and breadth equal to or less than 1.2 cm (i.e. 12 mm) as **bladelets** or **micro-blades.**

1. Retouched blade: Microlithic blades can be retouched in two different manners. These can be either bold retouchings on thick borders or a variety of microscopic retouchings. These can further be divided into two more varieties. That is to say, retouching a border to reinforce the sharpness in the

manner of Aurignacian blades or retouching abruptly to blunt a border in the manner of Perigordian blades. Therefore, at least 4 different kinds of microlithic retouched blades can be identified.

2. Obliquely Blunted blade: It is a specific variety of retouched blade. Here, one of the lateral borders is blunted. The blunting is done in such a manner as to meet the opposite sharp border anteriorly. The blunted border may be smooth and convex or it may be angular. In specifically broad blades this type looks very much like a diminutive Chattelperron knife and hence is also referred to as **Pen knife.** Azilian point of Europe, although quite young (Epi-Palaeolithic) in date is also referred to as Pen Knife in European literature. An obliquely blunted microlithic blade is usually much smaller than even these Azilian points.

3. Point: Any blade broken in a triangular manner and then retouched along both the sloping borders to give rise to the point is designated as the type **Point.** Sometimes thick blades or bladelets between 5-6 cm in length are steeply retouched along the borders to give rise to a point at both the anterior as also the posterior end. These double points are termed **Sauveterranean points** after the Mesolithic site called **Saveterre-La Lemance** from south France. There is also a diminutive form of Gravettian point made on bladelets during Mesolithic period and these are termed **Micro-Gravette** points. Instances of points made on microlithic flakes are also known in many areas and these need to be distinguished as **flake-points.**

4. Triangle: These are one of the most beautiful tool types of Mesolithic culture. The type is counted as geometric microlith. These are usually shorter and smaller than points and have no reinforcement of the point. It has usually one border or/and base which are retouched in this type. Two most characteristic triangles are

(a) Scalene triangle and

(b) Isocelles triangle

When a blade is shaped in the form of a scalene triangle by retouching the two borders that form the obtuse angle the type is called a **scalene triangle.** There are many variations possible within this type. In triangles all the three borders may also be retouched. When a blade is specially shaped as an isocelles triangle and only the base is retouched (usually), it is termed as an **isocelies triangle.** It is needless to emphasize that there may be many borders retouched in this type as well. These merely serve as variations.

5. Crescent or Lunate: This is prepared by a semi-circular retouching of one of the borders of a blade and as such appears like a segment of a circle. In a typical piece the miximum width lies at the middle of the length of tool. Asymetrical lunates can merge with the range of variations of scalene triangles.

6. Trapeze: These are trapezoid segments of blades the borders of which are retouched. This is taken as another geometric microlith. Usually more than one border is retouched and in rare cases all the four borders may be retouched.

7. Microburin: Besides normal burins, often prepared on fragments of fluted cores, mesolithic industries in many areas, have yielded Microburins. It is a tiny burin prepared on a notch in such a manner that the facet below is in the same plane as the dorsal surface and the notch is in the under surface. (In normal burins the facets are across the dorso-ventral plane and hence the burin edge is equal to the thickness of the blade).

7. Neolithic Types

One of the most common and almost diagnostic type fossils of this period is a ground axe. There can be a large variety of these ground axes and all of these can be clubbed together under the family name of **celt.** In other words, celts can be defined as simply ground axes. There are at least 3 main types within which the celts can be divided. These are: **Axes, Adzes** and **Chisels.**

Axes are roughly triangular in form with a firm transverse edge. The specimen may be oval to rectangular in cross-section. The working edge is invariably ground and polished. In addition to this many specimens are totally ground and smothened. Axes can be further sub-divided according to the nature of the butt-end preparation. In many instances butt-end may be rectangular without any grinding, in some it may be rounded off while in a third kind the butt may be specially pointed. To distinguish the axes from the adzes it is recommended to consider only those celts as axes that are biconvex in profile (minimally only the profile of the working end).

Adzes are similar to axes in all general features except that these are usually thinner and hence may have been prepared on suitable flakes. The transverse working border is formed by a convex surface meeting a flat undersurface. This levelling can also be done by flat rubbing of one surface of an otherwise thin axe. In profile all adzes are plano-convex in shape.

Chisels are small, narrow, rectangular pieces in which the two broader

surfaces slope down to meet at the working end while the smaller surfaces running in place of the two lateral borders remain smooth without any kind of slope. These are usually much longer than the axes or adzes.

Shouldered celts are celts occurring in south-east Asian Neolithic sites only. These can be axes or adzes at the butt-end of which sharp rectilinear shoulders have been cut-out. The right angled nature of these shoulders led many authorities to believe that metal wires must have been used to do the cutting and hence these are younger than neolithic age (which by definition is a pre-metal age). Subsequent experiments seem to have demonstrated that thin silver of bamboo with sand and water can make such cuts in some softer variety of stones. Hence it is quite likely that some of them may represent a Neolithic type.

Besides these basic types almost all Neolithic sites yield a large number of ring stones, saddle and querns, bolas and grooved bolas as well. Since these are mere stone pieces put to different uses they do not involve any specific typotechnological description. It is also important to mention that most of the Neolithic sites also introduce the use of ceramics for the first time. We can go into ceramic technology and types in the following section.

8. Chalcolithic or Ceramic Types

From Chalcolithic to early historic archaeology ceramics form the most predominant left over. It is not surprising, therefore, that the typo-technology of ceramics during this period forms the main tool of analysis. Evidences of structures, ornaments, weapons and many other spheres of activities may also be known but these do not form such a regular feature as to form a unit of typology. Hence ceramics have to stay as the main diagnostic attribute of all Chalcolithic and subsequent cultural stages till proper history came up. Regarding the using of ceramics as diagnostic trait it needs to be emphasized that two **different cultures** in contemporary Indian villages may be known to use identical ceramic types and such evidences, when known from prehistory, are bound to be grouped as a **single culture.** That is, our identification is merely at the level of ceramic distributional homogeneity or heterogeneity in the absence of any other cultural attributes. Many ceramic cultures identified in the past, therefore, might have been in reality an agglomeration of different cultural groups having trade supply of ceramics from a single central group. The technique of pottery manufacturing has been studied in detail in the recent past. The techniques identified are represented in terms of clay preparation, process of obtaining the shape, finishing and firing. The typological

classification is mainly based on the detailed morphological features. Like in the stone age, here also there is always an intimate relationship of techniques with types.

Technique of manufacture

1. Clay preparation is an essential step in processing to prepare a pot. Alluvium of river banks or large lakes is often the most suitable material. Since the nature of the clay deposition in a river depends on the nature of rock and soil through which the river flows many alluvial deposits are not very suitable for the preparation of pots. In such areaseven the clay needs special preparation. Usually clays rich in minerals and capable of forming an extremely fine grained homogeneity are the most suitable for giving shapes. Thus, the clay used in the making of a pot can be of : (a) Well levigated structure (b) Coarse grained structure, or at times deliberately mixed with external agencies like husk, powdered stone, sand, grass or hay or similar other material. In this case the clay is identified as (c) Tempered with **whatever** be the tempering material.

2. The actual shaping of a pot can be done by two basic ways. It could be handmade or wheelmade. The handmade pots can be either made with coil of clay arrangement or using a mould. The prepared clay can be arranged in a coil to obtain the pot shape and then beaten with a flat wood from outside and absorbing the force on a stone pebble from the inside. This beating releases large amount of clay surface to enable shaping a much bigger pot than the original clay coil. In another method a basket mould or the mould of a broken pot can be used to plaster clay from inside and then lift the finished shape out of the mould. Final finishing does require beating in the same manner as used for the coiled pots. All handmade pots lack the characteristic rows of circular lines noted in the modern pot surfaces.

In wheel made pottery prepared clay is put at the central region of a heavy wheel fixed on a pivoted fulcrum. The wheel is given rotatory motion first and then the mud is slowly pulled with the help of the thumb and the rest of the four fingers manipulating it. The centrifugal force on the mud in rotation helps to create a uniform circular shape. All wheel made pottery can be identified by observing the fine lines of granular arrangement visible on the surface of the pot. As a rule almost all the wheel made pots can be made very thin and the thickness is uniform over the entire surface. The wheel helps in completing a shape but the rest of the treatments are a more time consuming

and tedious. Normally the finished pot is further given thorough touch of frequently wetted hands. This enables the small pores on the surface of the pot to be filled in and a generally shining surface appears. This treatment is called **burnishing.** At times a mud and colour mixture is made and the pot is coated with this solution before allowing it to sun dry. This also renders closing all pores on the surface besides coating it with a desired colour. This treatment is called **slipping.** In some specific cases a pot may be first slipped in a light colour and then allowed to sun dry for an hour or so and then again dipped in another darker coloured slip. Again it is allowed to dry for an hour or so. Then lightly scratched designs are executed on the surface in such a manner that the lower slip is exposed on the scratched lines. The design is finally made permanent by firing. This treatment is called **reserved slipping. A colour wash** can be given before or after firing and this forms yet another form of surface treatment.

Any pot surface which has been given no such treatment is usually referred to as **matted surface.** Often this can be further roughened by sticking wet hands on the surface and then lifting up the hand. Such surfaces are referred to as **rusticated surfaces.**

3. Firing: The final texture of the pot, however, depends a great deal on firing. A smooth and uniform texture can be achieved only when there is an open hearth firing in the presence of uniformly controlled ventiliation, a suitable media that burns gradually and a proper piling of the pots to be fired. Uniform supply of air can be maintained by digging out air ducts from the bottom of the furnace. A regulated firing usually turns clay into brick red colour. If the temperature is not high enough it may cause blotchy appearance on the surface and at times even if the surface has uniformly turned red there will always be a core within the thickness of the clay which will remain grey. It is only in adequately maintained temperature, duration and air circulation that the entire thickness of the clay turns red. We can, thus, distinguish an ill fired pot from a well fired one by looking into the results. There are two specific generic ceramic types known in prehistory which are mainly created by specially devised firing techniques.

(i) Painted Grey Ware or PGW are the ceramics which have been fired grey and then painted with black designs. The name chosen is highly misleading and can lead many beginners to think this as a type which is painted with grey colour. The grey colour, it is believed, is obtained by firing thin clay pots to as high a temperature as 800° C. Such a high temperature can be achieved only

in closed furnace with constant feeding of fuel and oxygen from the bottom.

(ii) Black-and-Red Ware or BRW is a very interesting variety of ceramics which is caused by a firing technique. These are completely black in the inside and around the rim on the outside. The rest of the outer surface is brick red. The rendering of entire inside black led many a archaeologist to believe that this is the result of inverted firing in the absence of an adequate supply of oxygen. Chemical studies of the scraped surface, however, show that the lack colour (which is not only on the surface but extends half through the thickness--the rest half being red upto the outer surface) is caused by carbon. It is, therefore, concluded that the sun dried pot must have been given a coating of some organic resin, oil or some similar matter, before firing. During firing this organic material on the surface as also the thickness through which it is absorbed, is burnt leaving the carbon free. Some authorities claim that double firing might have been required for this type of surface finish. It is important to note at this juncture that Black-and-Red Ware shapes are usually medium to small in size and never include large storage pots. In other words these seem to be only ''table-wares'' and hence may be given special treatments by the culture using them.

4. Painting and Decorating: A pot may be painted before firing. These paintaings are usually more permanent. Subsequent to firing the same painted designs may again be reinforced with another coat. In rare instances a special glaze may be given after the painting. This glaze is prepared by crushing **tamarind** seeds and cooking the powder in water. This solution is colourless and when spread on a painted surface protects the paint in case it is done after firing and also renders the surface glazed like glass. Incised decorations are quite common in many prehistoric pots and these need to be done before firing. These may be simple nail depressions in a series or even horizontal lines scratched along the neck. Sometimes small lumps of clay are fixed on the surface in order to decorate and these are referred to as **applique bosses.** A special kind of incised decoration appears in many advanced ceramics which is so uniform that it is believed that a pattern has been first engraved on a wooden wheel and then the wheel has been rotated with a moderate pressure on the pot just after it has been taken off the wheel. These decorations are termed **roulette** decoration.

Painted decorations can be so varied that any typological designation of all of them is not possible. Nonetheless we do make distinction between pure geometric lines, crosses, circles, checker board, diamond etc. from natural depictions of wheat stock, pipal leaf, scorpion, stag, peacock or the like.

Seldom are these depictions realistic. There is always a degree of stylizat on involved in them. The areas covered with decoration, the normal range of de ictions in these decorations and the colour used often tend to show a un formity within a given culture. This has led many authorities to use suc terms as ''Harappan ware'' or ''Jorwe ware'', or the like. Strictly speaking th se usages are unscientific on many accounts. Firstly, all sherds found from Ha appa need to be conforming to what is meant generally by Harappan ware. econdly, such terms soon lead to crystallizing all traits of a culture wit in the ambit of the predefined cermics. That is, if we find a few X ceramics withi an otherwise Y ceramics assemblage we do not hesitate to conclude a contact between X and Y cultures. A culture by no means can be perceived merely o a predefined ceramic feature. Besides, internal heterogeneity within the culture is completely disregarded in this kind of ascriptions. Ceramic typ s or type like categories are attempted on the basis of the ab

e four aspects but these types by no means can be conceived of as finite in n mber. These are mere aids to conceiving an extremely varied situation thr ugh time. Shapes of the pots are often the most helpful indicators of a broad cultural area. To reconstruct this the sherds with natural rims are matched against circles with known diameters and the diameter of the pot--when unbroken--is determined. A straight line equal to the reconstructed diameter is then drawn on a drawing sheet. The sherd is held at the end of this line in such a manner that the natural rim faces the line. The contour of the sherd in profile is then drawn. On the other end of the line the same contour is repeated in opposite direction and at once a tentative shape of the pot of which the sherd forms a part becomes apparent. These shapes can at the most reveal the feature of the lip, neck and part of the body. The bottom of the pot still remains unknown. For this a separate estimation of the broken bottoms from within the collection needs to be done. Similarly spouts, if any, have to be likewise reconstructed.

Unfortunately, unlike stone age analysis no standard expression to describe these features are there in ceramics. We may cite below one of the best attempts on ceramic shapes as an example for a beginner to formulate his own approach. Jim Shaffer (1978) in his analysis of Said Qala Tepe ceramics divided a vessel into 3 zones: *(i)* the lip form, *(ii)* the base form and *(iii)* the vessel form. The lip is defined as the area where the exterior and the interior wall surfaces cease to be parallel. This area should be located within 2 cm of the vessel orifice. A suitable classification of various forms of lips can be very important in deciding a ceramic trend.

In the same way there can be several base forms identified. Vessel forms are categorized as **bowls** when their diameters are greater than or equal to their heights. Further the maximum diameter in bowls always occurs at the orifice or within 2 cm of the orifice. If the height is less than half the diameter such shapes can be designate as **dishes.** If the vessel has a height which is more than the diameter it is called **Jar**. That is:

$$d \geq h \quad \text{Bowls}$$

$$\frac{D}{2} \geq h \quad \text{Dishes}$$

$$d < h \quad \text{Jars}$$

There may be Jars with height more than the diameter but maximum diameter is located in the lower two-third which should be identified as simple Jars but in cases where the maximum diameter is located in the lower one-third such jars may be called Beaker/Goblet/small Jars. The profile of the vessel can often be used to add further information on the shape. For instance, a **carinated** vessel refers to a bowl in which the body instead of being convex in profile has a sharp angularity. Similarly bodies can be spherical, goblet like or even cylindrical. A ceramic type, therefore, refers primarily to the shape and decoration but can include fabric and firing as well to indicate the technique.

Under Chalcolithic techniques the most significant innovation had been the knowledge of metal extraction. This not only required the identification of ore and then its preparation for the furnace with the addition of adequate slag before firing but also casting the metal into different required shapes as well. Obviously this was a group activity and demonstrates both the knowledge and organizing of labour and resource for its implementation. The constant need of fuel for the furnaces must have kept a battery of workers constantly engaged in cutting trees, drying them and transporting them while another group must have been busy querrying the ore, transporting them and preparing them. A culture can take off as a successful Chalcolithic phase only when an adequate demographic structure coupled with an ideological and social structure suited to this group activity is reached. It is not surprising, therefore, that terracotta figurines, spindles, bricks, bangles and many other allied cultural materials materialize during this stage of culture. We shall refer students of prehistoric technology at this stage to more specialized works to learn about the techniques of preparation of most of the other cultural materials.

CHAPTER IV

Terminology

A precise and self-explanatory terminology is one of the essential prerequisites for any systematic study. In the initial stages of prehistoric interest a large number of terms were used by explorers without adequately defining them. By the time the subject enters the threshold of an established discipline the literature is found flooded with these terms. To a student of archaeology it is important that a distinction is made from these terms as they were meant or used then and as they are used today. These become specially relevant in stone age prehistory because here most of these descriptive terms of the formative period are resurrected with proper definitions to back them.

The three ages

For instance, the designation of the cultural past of man was done by P.F. Suhm in as early as 1776. He described the cultural stages of prehistoric Denmark into a three age system: **the stone Age, the Bronze Age** and **the Iron Age.** C.J. Thomsen in 1836 followed the same to arrange the exhibits in Danish museums. Lubbock in France divided the stone age further into **Palaeolithic** and **Neolithic.** The definitions for these periods were mainly based on typotechnological features of the stone tools. Nearly seven years after Lubbock's attempt it was felt that Neolithic, though a stone age culture, occupies comparatively a quite recent past in man's cultural history. As such Lartet in 1870 tried to further divide the larger part of our stone age history into three more periods viz., **Lower, Middle** and **Upper Palaeolithic.** These divisions of Palaeolithic were mainly based on the change of fauna observed with different Palaeolithic industries. In 1930 Gabriel de Mortillet, a French investigator, attacked the practice of naming cultural divisions in the manner of compartments or stages. He argued that it is more relevant to identify traditions of cultures in the same manner as one would do in ethnography. His classification (though it mainly aims at identifying cultural forms) laid emphasis on one succeeding the other and hence indirectly formulated a chronological scheme of cultural sequence. At present the names of the traditions emphasize the cultural forms rather than age, specially when used out of the original context. For example, the Acheulian tradition as identified in western Europe may be much older than the same tradition in India.

Chronological ages. Subsequently Garrod and Leakey in 1952 advocated the use of purely chronological nomenclature for designating prehistoric cultures. But it could not be used widely as Neolithic and Chalcolithic periods cannot be given any common and acceptable chronological definition at any world-wide level.

Economic ages. Finally in 1961 Thomson and Braidwood suggested a three fold nomenclature to describe the prehistoric cultures upto Neolithic period. They suggested that the early part of Palaeolithic culture be called **food gathering** period and the later part of Palaeolithic, when organized hunting and selective collecting was done, be called **food collecting** period. Finally, the period marking the beginning of agriculture was termed as **food producing** period. Such terminologies on the basis of subsistence were only hypothetical as the use of such terms would obviously include many a present day population within the meaning of the prehistoric periods suggested. The terms used today for broad cultural designation are the same as suggested by Lartet but there are stricter definitional controls on them. On a worldwide basis the various terms used may have the following definitions.

Chrono-Cultural ages

Palaeolithic: The earliest of human cultures occur within the Pleistoncene period. These essentially comprise stone tools prepared with low expenditure of energy in their manufacture. The subsistence economy at this stage by definition is hunting and gathering. This may further be sub-divided into four stages on the basis of cultural features. The generally accepted features are: *(i)* **Lower Palaeolithic** mainly contains core tools which are medium to massive in shape; *(ii)* **Middle Palaeolithic** mainly contains an emphasis on flake tools with a preponderance of side scrapers; *(iii)* **Upper Palaeolithic** mainly contains thick elongated tools with a good percentage of finished bone tools and a good degree of art execution. *(iv)* Finally a terminal Pleistoncene stage of culture is added with blade tools which are not as big as the Upper Palaeolithic and also not as small as the Mesolithic. This stage has been named as the **Epi-Palaeolithic.**

Mesolithic: The earliest Holocene culture which shows no indication of a change in economy from the Palaeolithic is broadly called Mesolithic. Usually there is a worldwide change towards microlithization observed during this period. It is also accepted as the period in which hafting of a series of tools on suitable organic handles has emerged as a new technological evolution. The tradition of composit tool manufacture has lead to a speciali-

zation in microlithic types in almost all over the Old World during this period.

Neolithic: This is the last of the stone ages in human history. It is best defined as that period which preceeds the discovery of metals and which shows the earliest evidence of any one or more of the following socio-economic traits:

i) Evidence of food production precisely demonstrated with domesticated varieties of cereals. Indirect evidence of productive economy like saddle and querns or ceramics are not always known to be developed coevally with agriculture. Evidences from Kurdisthan and Laristhan demonstrate communities collecting wild barley in the same manner as any collecting economy would and using both ceramics as also saddle and querns.

ii) Evidence of animal domestication as a live stock economic means. Here again mere Palaeontological evidence of a species being domesticated has not always been correctly understood. Any species which leaves its natural habitat and starts living as a parasite along the periphery of human settlements for generations will start developing palaeontological changes caused by the adaptation in non-competitive existence. In this regard we may soon find the man-eating tigers of Lakhimpur-Kheri district (U.P.) developing attributes of domestication in their bones. What is more important is to find out whether man has bred a species in captivity for its own econmic benefits. The only way this can be conclusively proved is to obtain an age-sex wise statistics of the slaughtered animals.

iii) Communities which adopt agriculture, no matter in what rudimentary stage it is, will always tend to be less mobile. Subsequently sedentism is accepted as an indicator of agricultural knowledge. Since agricultural success requires larger band or group size, the settling of such a group invariably requires a social control to prevent conflict. In other words, Neolithic sites can also be indentified on the basis of evidences of villages, temple structures or similar other indicators of the sacred and the secular trends.

In most of the Neolithic sites a new lithic technique is introduced. This is called the grinding and polishing technique.

Chalcolithic: This term is used to designate the cultural period which marked the emergence of metals like copper, tin, lead and gold and subsequently manufacturing and alloys. Since such an emergent technology can never replace the earlier techniques, stone tools continue to occure in this period. Hence the name **Chalco-lithic.** There has been prolonged debate about whether the knowledge of metallurgy should be taken as the diagnostic trait

of Chalcolithic cultures or the mere presence of metal (even if it is a single piece) within a find should be enough to declare it so, since metallurgy is demostrable only at places of natural occurrence of ore. There is no archaeological way to prove if a given site represents a metal manufacturing community expanding its power over larger area and hence away from the actual manufacturing site or it represents a non-manufacturing community who obtained metals by way of trade only. The mere presence of metal, therefore, is taken to designate the find as Chalcolithic. It is needless to emphasize that the culture has to be proved to be pre-iron in technique.

Most of the terms given above are to facilitate student's understanding of accepted usages of cultural terms, but more often than not improvising these terms to suit a given situation is necessary in many cultural areas. Hence in India we have the term **Neo-Chalcolithic** or in Anatolia the **Aceramic Neolithic.** These new improvised terms are self-explanatory to anybody who is introduced to basic terms.

CHAPTER V

Indian Prehistory (A Prelude)

1. The Geo-climatic regimes

India is perhaps the largest peninsular landmass in the world constituting a single country. It lies between 8°4'N to 37°6'N and 68°7' E to 97°25'E. It runs to nearly 3200 Km along its north-south axis. It's areal coverage is 3,267,500 square kilometers. Prior to 600 million years ago and almost upto 120 million years from today most of its western provinces beyond the Aravallis were under sea. Archaean gneisses and granites formed the main landmass of the subcontinent. The Aravalli formations, starting to rise around the Pre-Cambrian era (prior to 600 million years), separated the western sea from the Himalayan sea. The **Dharwarian** group forms the first mixed sediments to cover the original crust of Archaean formations. Around 500 million years ago a humid climatic regime developed and this caused several meters deep calcareous depositions. The **Cuddapah** formation corresponds to this period. The Vindhyan basin was also uplifted during this phase. This was followed by extensive glacio-fluvial deposits from a southern source, not so far specifically indentified. These deposits are named as **Gondowana** formations. During the middle of the Mesozoic period around 200 million years ago, the continent got separated from Africe, Australia and South America. Subsequent to this, one of the greatest volcanic eruptions took place in the Pacific and most of the earlier deposits were deeply buried under volcanic lava in most parts of the peninsular region. The rise of the Himalayas and along with this the entire area west of Aravallis was exposed creating a huge landmass that constitutes western Rajasthan and parts of Pakistan today. It was much later during late Quarternary i.e., less than one million years ago that the Ganga-Jamuna trough alongwith numerous water courses of Himalayan origin started filling up the sub-Himalayan depression. When man evolved, India had acquired its present shape although most of its water courses were still not flowing in a permanent bed. By late Lower Pleistocene and early Middle Pleistocene, India emerged as a country capped by Himalayan ranges in the north along with the chain of **Patkai** and the **Suleman** ranges forming two arms in the east and the west respectively, and the Western and the Eastern Ghats running along the two borders of its peninsular extension.

This brief and oversimplified account of the geological history of the country is the backdrop against which a workable chronology of this region has to be developed. Active geological events have taken place even after Pleistocene depositions and have made this job of working out a chronology for this country very challanging. Most of the archaelogical interpretations, besides working out chronologies, depend heavily on climatic interpretations and this is often made possible by comparisons with the present climate of the region. The various climatic regions within which India is broadly divided can, therefore, be briefly described here as follows:

A. Moist Tropical Forests: Moist tropical forests are a variety of eco-niche which has been identified in a varied dispersed spread over several regions of the country. Some of the variations, as such, will be more meaningful for our understanding.

1. Tropical wet evergreen: This is an ecological regime which occurs at varied altitudes with an yearly rainfall exceeding 250 cm. In Assam this occurs upto 1070 meters while on the western coast the wet evergreen forest is maintained upto 1370 meter altitude. These are forests with multiple canopies and very rich undergrowth. The plants usually found in this climate are *Dipercarps, Shorea* and *Hopea.*

2. Tropical moist semi-evergreen: This climate regime is mostly confined to the western ghats although some specific regions of Assam, Bengal and Orissa may also be included in this group. Here the annual rainfall varies between 200-250 cm. The main floral character is provided by the *Engenia cinnamomume*. A lush undergrowth is also invariably present.

3. Deciduous: Moist deciduous forests are generally restricted to the peninsular upland between the western and the eastern ghats. Sal *(Shorea robustus)* and Teak *(Tectona grandis)* constitute the most characteristic species of this zone. Rainfall for this zone can be extremely varied, and depends largely on whether one is nearer to the ghats or in the inland region. It can vary from almost 200 cm near the ghats to less than 100 cm inland.

B. Dry Tropical Forests: Dry tropical species abound in areas where the annual rainfall does not exceed 100 cm. The Himalayan foot-hills, Satpudas, Maikals, the eastern slopes of the Aravallis and the inner slopes of the ghats provide this climatic zone. The floral variety is usually stunted and may contain berries. Date palms *(Phonix sylvestris)* abound besides some sprinkling of larger deciduous trees depending on local rainfall and soil conditions. There is a strong likelihood that most of the present day-dry

tropical forest areas must have maintained deciduous forests during the Pleistocene. The increasing aridity of Holocene with the ever-increasing human interference in the recent years has pushed this climatic regime to almost the entire inland areas along the tropic of cancer.

Besides these four main climatic regimes, India maintains a typical desert region to the west of the Aravallis which receives less than 25 cm rain-fall per annum. At high altitudes, several special and characteristic eco-regimes seem to develop along the Himalayas. Finally the biggest drainage of the Ganga-Jamuna trough develops its own climatic regime based on the extremes of the seasons and the monsoon.

Much of the identified eco-zones are fast changing because of a combination of several factors but the occurrence of such species as Rhinoceros within the sand dunes of northern Gujrat and Hippopotamus from almost all river deposits in both central and western India only indicate that the tropical wet evergreen forest which is found today in areas of more than 250 cm annual rain fall must have covered most of the coastal regions of India during the early and mid Pleistocene. Human colonization of these areas would, therefore, seem not very likely. It is only in the other two varieties, i.e., tropical moist semi-evergreen and deciduous forest regions that human occupations must have occurred. The amount of human cultural debries found from the heart of the desert, in both, the Indian and Pakistan part of it, also tends to indicate that much of the northern part of the desert had maintained a dry tropical forest, if not actually a deciduous forest regime, in certain places. Climatic reconstruction of the desert, in recent years, has attracted so much attention from the experts that one can almost reconstruct the climatic fluctuations of the area with accurate dates for at least the last 20,000 years. For the rest of the Pleistocene, however, it has to be based on such chance finds of faunal remains as the rhinoceros shoulder blade from Mehsana district, Gujarat.

2. The History of Development of Archaeology in India

Col. Meadows **Tylor** of the early nineteenth century was one of the earliest to show interest in the archaeology of India. His interest, however, remained more concentrated on the south Indian **Megaliths**. Alexander Cunningham in 1861 and Robert Bruce Foote in 1863 began their explorations and recording of prehistoric antiquities of the country in the subsequent period. While the former concentrated on the historic period and that too of the northern regions of India, the latter was more extensive in his interest extended to even the

earliest stone age period. In fact the credit for reporting the first Palaeolithic tools from India is also given to Robert Bruce Foote. The spectacular discovery of Harappa and Mohenjodaro during the early twenties of this century brought about a great deal of interest in Indian archaeology among the scholars. In 1930 Burkitt reported on Cammiade's stone age tools collected from lower Krishna valley and also attempted to create a climatic succession for 'Indian Pleistocene' period on Richardson's line of what has been attempted in early African prehistory. De Terra and Paterson in 1939 published their detailed geological study of the Potwar region in Punjab and also described the tools associated with the identified climatic succession. Almost in the same year Michael Todd reported an Upper Palaeolithic in stratigraphic context from Khandivli near Bombay.

In the strictly chronological sense, one can see that the rise and development of interest in Indian archaeology follows almost parallely with the same in France and England. In 1861 the Archaeological Survey of India was established and this was broadly the period when in Denmark the Prehistoric Museum was being established by organizing amaturists. A.C. Carlleyle discovered microliths in the rock-shelters in Mirzapur along with Mesolithic cave paintings during 1863-1885. In European prehistory Gabriel de Mortilett was still to come out with the names of various traditions of the Palaeolithic period, and the real antiquity of some rock paintings discovered in Spain and France was still being disputed at this time. India, in this sense, has seen many firsts in the history of development of Euro-Asiatic archaeology.

A proper synthesis of retrieved fragments of the past was not attempted till 1950 when Stuart Piggot brought out the book *Prehistoric India*. Of course, works of Panchanan Mitra, on the same lines preced Piggot's by a couple of decades but the amount of material discovered till his time was too rudimentary to form a complete picture. Researches in Archaeology of India for the period between 1861 to 1944 can be best compared with a stamp collection and had not formulated any theoretical paradigm (Kuhn, 1970 calls it the Pre-Paradigm-stage). It was only in 1944 that Sir Mortimer Wheeler started baptising a series of Indian archaeologists into what Dhavalikar (1984) calls the 'time-space'perspective, the archaeologists in India could now collect their 'stamps' without damaging the corners and also learn the method of arranging them within a given 'album'. This could be achieved by adhering to type excavating technique evolved by Mortimer Wheeler and developing vertical sequencing of excavated material. The baptism could not, however, be carried on for a long period. By 1948 Wheeler left the country. But the

missionary zeal of the new converts, no matter how few they were, was enough to develop a distinct variety of archaeologists in India to whom the time-space frame was the only goal an archaeologist was supposed to serve.

In 1961, the first international conference of Asian archaeology was organized by the Archaeological Survey of India to mark the occasion of their completing one hundred years of existence. The deliberations of this conference, at many points, brought Indian archaeologists face to face with anthropology but the total pre-occupation of the former with pot sherds, stone tools or megaliths on the one hand and with terraces, layers and phases on the other, made them totally ignore the cultural logic of the renowned anthropologists. From then onwards there has been no looking back. Archaeology in India has progressively moved away from anthropology. Any criticism of our inadequate chronology has been adequately met with by delving deeper and deeper in our vertical trenches. Inevitable requirement of natural and biological sciences to perfect our time sequence is being emphasized. The Tata Institute of Fundamental Research was established in 1961 and a plethora of radiocarbon dates started appearing from our Chalcolithic sites. In 1964, Deccan College, Pune for the first time attempted to bring together all the information gathered till then in Indian Archaeology. Almost in the same year (1965) D.D. Kosambi brought out *The Culture and Civilization of Ancient India in Historical Outline*. The book became an instant success in sociology, history and Indology. It aims at the reconstruction of Indian civilization as a dynamic process with the help of archaeological, textual and mythological basis whenever and whichever is available. In Indian archaeology this book did not even create a ripple. To most of the archaeologists his approach was ridiculous as looking through the wrong end of the telescope. Subbarao's *The Personality of India* (1958) made a much bigger impact than Kosambi's work could. This was primarily because Subbarao's approach was purely anthropogeographic and also such an approach has a common-sense level attraction as well. The establishment of a special journal for archaeology, **Puratattva,** in 1967 shows that by this time a marked increase in the number of scholars involved in archaeological research must have occurred. University departments, museums and research institutes were generating fresh data from all over the country. A look through the contents of the early issues of this Journal can at once explain the generalized trend set for archaeological researches in India. The questions asked and dealt with are by no means unimportant, but nothing can be further from anthropology than these researches.

Archaeology in the United States during this period was passing through a series of reformations and rethinking. While Binford brought out his

'Archaeological Systematics and the Study of Culture Process' ; in 1965, Chang (1963) appealed for more studies in settlement archaeology. In 1967 Deetz gave an *'Invitation to Archaeology'* for looking beyond material culture. Orme (1972) came out almost openly to recommend anthropological models for culture studies. Allen and Richardson (1971) went way ahead of all by even recommending methods of reconstructing kinship from archaeological data. All this was so bewildering for the conservative school of archaeologists that Jacquetta Hawks (1968) could not help but bring out her apprehensions in print. The only Indian to have reacted to Hawks was D.P.Agarwal (1970). The latter goes all the way to support the changes in archaeology where, increasingly, natural and biological sciences are being used. Surprisingly he does not comment on the need of these objectivized environmental data for serving the new paradigm that archaeology was adopting in the west. Another Indian scholar after a short stay in California came back and wrote a book to emphasize the very important cause anthropology can serve in Indian archaeology (Malik, 1968). Again this solitary attempt to wed the two branches could not bring the desired change because of its rather sharp criticism of the existing school and theoretically weak arguments for anthropology.

It is evident that the preoccupation in India was increasingly getting tangled in environmental archaeology and the reasons for this are fairly evident. In the first place, India had always suffered from the lack of a scientifically demonstrative chronological framework. This, in the face of a Wheelerian obsession for constructing sequences, gave birth to a distinct chip on their shoulder. In the second place, a large number of the new generation archaeologists in USA started reviving ecology as a dominant factor in moulding human culture (Flannery, 1972). The seminar on *Radiocarbon and Indian Archaeology* (Ghosh and Agrawal, 1972) plainly shows the effects of these developments in Indian archaeology. A combined thrust of newer demands of environmental studies in archaeology on the one hand and the need to classify the enormous amount of data within an environmental frame on the other, must have caused the emergence of the *Indian Society for Prehistoric and Quarternary Studies* in 1977. The first volume of the organ of this society named *Man and Environment* appeared the same year. Sankalia's updating work of *Prehistory and Protohistory of India and Pakistan* (1974) incorporates a considerable amount of the new body of data from the Middle East including the remarkable evidence from Mehergarh but discussion of culture-process is kept to the minimum. In 1978, Allchin, Goudie and Hegde brought out *The Prehistory and Protohistory of the Great Indian Desert.* Allchin and Chakravarti's *A*

Source book of Indian Archaeology (1979) surprisingly does not even raise the issues which are relevant in any historical summary. There are some others like Pant's *Prehistoric Uttar Pradesh* (1982) or Jaiswal's *Chopper-Chopping Component of Palaeolithic India* (1982) but these address themselves to fragmented areas or features. Agrawal's latest book called *The Archaeology of India* (1982) attempts to summarize all the archaeological material of past researches apparently within a historical framework. There is no theory in this book, not even broad generalizations. He does fall back on anthropology but only so far as the selection of chapter headings go, e.g., 'The first farming cultures'. But he demolishes all hopes for anthropological archaeology when in the 7th line after opening the chapter on Prehistoric Art he writes, *Possibly he* (the Mesolithic man) *did not even believe in anything beyond the material. There were no gods, religion or after-life''*. (page 77, italics mine). One wonders whether Agrawal is describing the capitalistic western world of today!

Finally I shall like to briefly refer to the impact of **New Archaeology** or what Dhavalikar would like to call 'Bin-Clarke' revolution in Indian archaeology. Sankalia himself chose this topic for the D N Majumdar memorial lecture in 1974 (Sankalia, 1977). The very fact that he chose to examine 'New Archaeology' in a very pointed fashion, should have made some impact on Indian archaeologists, but apparently they had no time for theory when they were busy with classifying 'pots and pans' or 'stones and bones' coming out of their on-going excavations. The only reverberation of this was felt in 1985 when Deccan College organized a seminar on *Recent Advances in Indian Archaeology*. The proceedings report is edited by Deo and Paddayya (1985). Paddayya goes all out to initiate the Indian archaeologists to the concept and methods of processual archaeology--but alas what follows is the same stuff--although carrying such ambitious and misleading captions as 'Cultural Ecology, of Early Man in India' or 'Cultural Ecology of the Neolithic India.'

The above discussion will clearly demonstrate that Indian archaeology still remains in what may be described as a **''descriptive stage''**. An **analytical stage** in archaeology can not emerge without a sound theoretical foundation for the structure of culture or culture change. Such a change seems a very remote liklihood without developing anthropological archaeology in India. Archaeology in our country has its umbilical cord tied to history and this kind of archaeology cannot help us much in understanding such a complex country as India.

3. Towards a Regional Perspective

Earlier we have seen the how and the why of the existence of diverse climatic regimes in India. While most of the peninsular region remains essentially tropical the rest of the country is governed by a number of seasons of which Summer, Monsoon and Winter are the dominant ones. The Himalayas, covering almost the entire northern boundary, and its two axial chains, viz, Sulaiman in the west and Patkai in the east, forms a fairly good barrier for the country from the Siberian cold winds. The height of the Himalayas being almost of the same level as the westerly currents, a predictable monsoon for the country is almost assured by the giant mountain maintaining the line of **Inter-Tropical Discontinuity** constantly to the south of the mountains.

It is a common experience for anybody who visits India to see this diversity and almost accept this landmass as a conglomerate of several entirely 'different worlds' which are merely wrapped up together with a common history. It will not be quite illogical, therefore, to conceive India as forming distinct culture areas with almost insular boundaries. Subbarao (1958) had already attempted this using the then available archaeological data. He could quite successfully demonstrate 'areas of attraction', 'areas of relative isolation', 'areas penetrated recently' and the like. It is not surprising that all the large river valleys like Indus, Ganges, Godavari and Krishna have been shown as areas of attraction or ''nuclear zones''. Obviously the perspective chosen is from the standpoint of early cultivators. Most of Narmada, Sone and Mahanadi or Burhabalang in this sense have been considered as areas of isolation in the light of the Neolithic sites known till then. Today, we have Navdatoli near Narmada and Kuchai near Burhabalang--both demonstrative of a farming community settlement. Further, what has been counted as nuclear zone may not have been really an area of that big an attraction for early hunter-gatherers. In fact we have reasons to believe that the rocky or hilly areas maintaining deciduous forests with less than 200 cm annual rainfall may have been the most likely areas of attraction for the Lower Palaoelithic populations. One of the richest catche's of Palaeolithic concentration from India lies in the area which includes Narmada, the entire Chhotanagpur, northern Andhra and the Vindhyan segment of Uttar Pradesh. Areas of Palaeolithic occurrence outside this region are basically different in their character, and in great likelihood, also in origin. The adaptations chosen in these extra-nuclear zones for Palaeoliths and hence also their cultures are bound to be quite different from the majority already found. Thus, although the very character of India would seem to tempt one to a regional approach, yet such an approach may temporally be a failure.

4. Pleistocene Chronology

No study was specifically undertaken in India to construct a Pleistocene chronology applicable to the whole country till 1935 when the Yale-Cambridge expedition arrived. The detail study of the Kashmir and Potwar region, by the team led by De Terra and Paterson, helped to extend the already identified Siwalik succession into Pleistocene. De Terra and Paterson demonstrated a series of degradation and aggradation in the river Sohan near Rawalpindi and argued that the Potwar lake was forming during the entire Lower Pleistocene. During the early Middle Pleistocene the lake got filled and drained out because of the tilting of the land and over this laccustrine deposit the river Sohan started flowing--thus depositing the freshly brought glacio-fluvial material on top of it. They could also demonstrate that the Villafranchian horse *Equus hysudricus* which was found in direct association with the first Himalayan glaciation at Malshahibagh Karewa in Kashmir was also found in Tatrot--the penultimate deposition of the lake. Thus, all the other subsequent geological events could be conveniently arranged within the fourfold Alpine glaciation scheme.

The following details put it in still a simpler manner.

1. Northwest Punjab or Potwar was demonstrated by early geologists working there as being formed through the building of seven laccustrine units. These geologists named the deposits and gave them tenative Quarternary names on the basis of comparable faunal groups identified in them. These deposits together were termed as **'Siwalik succession'**, with three sub-divisions, shown, for convenience.

III.	Upper SIWALIK	7. *Pinjaur*	Ist Himalayan Int. Gl.
		6. Tatrot	Ist Himalayan Gl.
II.	Middle SIWALIK	5. Dhok Pathan	Upper Pliocene
		4. Nagri	Middle Pliocene
I.	Lower SIWALIK	3. Chinji	Lower Pliocene
		2. *Kamlial*	Upper Miocene
		1. Muree	

De Terra and Paterson could first demonstrate that the Tertiary fauna ends

with Dhok Pathan and, secondly, in Pinjaur occurs the first Villafranchian fauna which, in a contiguous region in Kashmir, is also found directly associated with the episode of the Ist Himalayan glaciation.

2. The entire succession in the rest of the Pleistocene period is recorded in the form of a series of terraces caused by a number of earthquakes. The deposits which were older and once formed the surface of the terrain, thus, got pushed up and the river Sohan cut a bed in the lower level to deposit its new, and hence younger, material there. These terraces are named by their position from the top. The original bed which marks the first descent of the river is called T_D and is composed of huge boulders found almost in the form of a conglomerate. This bed is now shifted to almost 147 meters above the present course of the river. Between this first episode and the present level of the river there are five more terraces and they are named serially. De Terra could demonstrate these with the succession of Pleistocene climatic episodes. Thus, if Tatrot represented the first glaciation, Pinjaur must be co-eval with first Interglaciation, T_D = IInd Glaciation, T_I = II Interglaciation and so on, as shown below.

Holocene		T_5	Modern Soil	
PLEISTOCENE	Upper	T_4	IVth Glacitation	
		T_3	Interglacial	
	Middle	T_2	IIIrd Glaciation	
		T_1	Interglacial	
		T_D	IInd Glaciation	
	Lower	Pinjaur	Interglacial	
		Tatrot	Villafranchian	Ist Glaciation

Although this was a mere transplantation of European chronometric model to India, one can not deny that as a pioneering work De Terra and Paterson's geological study in Punjab and Kashmir provided Indian archaeologists with

a firm time-frame for the first time on fairly logical grounds. De Terra and Paterson realized that they are dealing with essentially a tropical country and hence a chronology tied down with glacial events cannot be applicable to the whole country. It is perhaps with this idea that they surveyed the Narmada and identified parallel alluvial deposits for all the six terraces of Punjab. They argued that Narmada was not born during the Lower Pleistocene stage (comparable to Tatrot and Pinjaur in Potwar). Excessive leeching of the base rock occured during this period and caused the formation of a specific eroded rock type called **laterites**. Thus, corresponding to Tatrot they identified a fine film of homogeneous clay called **mottled clay** which is laid down by the meandering water flow.

That this chronology was not applicable to quite a number of specific instances, is clear from the fact that no sooner Mortimer Wheeler took up the helm of the Archaeological Survey of India he invited Fredrick Zeuner, a Quarternary geologist at London School, to India to provide a Pleistocene chronology for India. The first Gujarat Archaeological Expedition was thus undertaken in 1944 with Zeuner and Sankalia as the main experts. The team surveyed almost all the rivers in Gujarat and demonstrated that most of these recorded only two gravel beds. That is, unlike the five Pleistocene deposits demonstrated at Potwar and Narmada, only two wet phases are seen in other rivers. In other words, the oldest deposit in these rivers has to be accepted as belonging to the third glacial phase of the temperate chronology. Since then several discoveries in many areas have grossly changed the Pleistocene chronology established in the forties. We shall briefly look into these evidences before finally modifying the available chronometer.

1. A third gravel was identified at Belan in UP. It had not only yielded different cultural material than the preceding gravel but also provided a C-14 date of 23840 $\pm$ 830 B.C.

2. The oldest C--14 date recorded from the second gravel at Mula Dam is > 39000 B.C. (Dattawadi).

3. In a recent restudy of the Himalayan geology it was found that a thick moraine descended up to Potwar around 1.9 million years ago. Apparently this conglomerate had been identified as the T_D terrace by De Terra and Paterson.

4. Near Saurastra a single Lower Palaeolith was found buried under a miliolite deposit which could be indirectly dated to 120,000 B.P. Thus, the Palaeolith could apparently be dated from earlier than 120,000 B.P. All these evidences

put together would seem to indicate that taking the whole of India together the broad period of occurrence of the three conventional stages of Palaeolithic past are as follows:

Lower Palaeolithic Culture	:	1 million year in Punjab to 39,000 B.C. in the Deccan
Middle Palaeolithic Culture	:	39,000 B.C. to 23,000 B.C.
Upper Palaeolithic Culture	:	23,000 B.C. to 10,000 B.C.

Possehl (1975), who had critically examined the faunal and tool typological features of the sites known till then, felt that "The entrance of man into the sub-continent as it has been documented so far, was comparatively late, being in the third interglacial or Upper Pleistocene" (p 389). It would seem, in the light of the above evidences, that he may be correct for some parts of India, but surely the antecedents of man in this country can be pushed to well within Middle Pleistocene in some other parts, specially in the valleys of the north western region of India. The finding of the *Homo erectus* from Narmada would also indicate a greater antiquity of man's presence in this zone than what the faunal and geological evidences would indicate. This is on the assumption that an archaic *erectus* had to be pre-existing in this area in order to give rise to the advanced form discovered there. For most of the other evidences of what we call as **Acheulian** from India, Possehl may be broadly correct. Acheulian in India must have flourished between 100,000 to as late as 50,000 years before present. This is a time bracket in which most of Europe, excluding perhaps only the Mousterian zone in south west France, continues with a well developed upper Acheulian form. In Africa as well, the Acheulian continues till this date at many sites.

CHAPTER VI

Lower Palaeolithic or Early Stone Age

As pointed out earlier, this cultural stage in India can neither be conceived of as chronologically homogeneous nor can one think of the cultural phase as uniformly occurring all over the country. In different parts of the sub-continent different zones/trends of this culture occur at different times. One of the earliest methodical investigations of Palaeolithic culture (to be held still) remains the study conducted in Potwar by the Yale-Cambridge expedition under the leadership of H De Terra and Paterson.

1. Sohan

Between the river Indus and Jhelum a stretch of nearly 100 km is bound by four discontinuous mountain ranges. These are the Himalayas in the north, the Salt ranges in the south, Pirpanjal in the west and an extension of the Siwaliks in the east. This raised plateau is named **Potwar**. Rawalpindi lies almost in the centre of this plateau. The entire plateau is composed of almost 25,000 feet (approx 7,600 metres) thick Tertiary sediments almost entirely of lake origin. We have already mentioned the top six layers of this huge deposition which are normally referred to as 'Siwalik divisions'. The river Sohan or Soan (*Sobhana* in sanskrit) started flowing on this plateau in the Pleistocene period when the trough was almost filled up and there was no lake in existence any more. There were periodic earthquakes and the region was tectonically very unstable and, under these circumstances, the older beds of the river often got pushed upwards and the river had to form a new bed and follow a new course at a lower level. The process having repeated itself on a number of occasions, a terrace-like feature is exposed on both the banks of the river. De Terra and Paterson brilliantly correlated the entire geo-morphological process with the advance and retreat of the Himalayan glaciation. Thus, in an indirect way the Alpine chronology could be imported by them to India. Since a large number of Palaeoliths could also be collected by them, a cultural succession of a kind hitherto unknown for India could be established. We shall briefly go into this study in the following pages.

De Terra and Paterson explored the region around Potwar and the valley of Kashmir. Several types of moraine debris, locally called 'Karewas' were identified in the vicinity of the Dal lake by these experts. It was demonstrated that the Karewas at a place called Malshahibagh in Kashmir record the earliest Himalayan glaciation. In comparison the Tatrot deposits, although not formed by glacial effect, were found to have remarkable petrological and also faunal similarity with the Malshahibagh Karewas. This led them to ascribe the Tatrot zone in Potwar as belonging to the first Himalayan glaciation. Further, upto Dhokpathan the fauna in Potwar did not contain *Elephus, Equus* and *Bos,* which appear suddenly in the Tatrot zone and continue onwards. This was taken to mean a Villafranchian faunal 'break' and hence marking the beginning of Pleistocene.

Subsequent deposits in the Potwar region have also been likewise compared with the glacial deposits in the Kashmir area and a tentative correlation was derived as regards to both the kind of deposition as well as their faunal contents. Interestingly enough, after the Potwar plateau was filled with the lacustrine deposits of Pinjaur, the river Sohan started flowing over this newly formed plateau. During the advance of the Himalayan glaciers a huge debri was pushed along the course of the glaciers and this was taken down further along the course of the river by the melt water as it descended to lower altitudes. Further, at the lower altitudes the glacial phenomenon is believed to have resulted in a period of heavy rain fall or pluviation. Thus, what the melt water could not carry could now be flushed out by the swollen river fed by pluviation. Hence, in Potwar region thick deposits (occasionally as much as of 500 meters thickness), made up of these concretized boulders, were laid down. The fauna recovered from these boulder conglomerates are designated typologically as Middle Pleistocene. These include open forest and moisture loving creatures such as elephants, horses, buffaloes, wild cattle and hippo-potamus, turtle and crocodile.

In the subsequent phase, there was a degradation in the river and, consequently, a large expanse of the earlier bed was exposed by erosion. This rhythmic oscillation seems to have continued with the alternate climatic cycles. This changing regime of the river is termed as aggradation (for raised water level i.e., pluvial climate) and erosion (for depressed water level i.e., inter-pluvial climate) phases. Several tributaries of the Indus are recorded to have formed 4-5 terraces representing these phases of climatic fluctuations. In the figure overleaf a simplified version of these terraces as described by De Terra and Paterson is reproduced.

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1. Sohan

Between the river Indus and Jhelum a stretch of nearly 100 km is bound by four discontinuous mountain ranges. These are the Himalayas in the north, the Salt ranges in the south, Pirpanjal in the west and an extension of the Siwaliks in the east. This raised plateau is named **Potwar**. Rawalpindi lies almost in the centre of this plateau. The entire plateau is composed of almost 25,000 feet (approx 7,600 metres) thick Tertiary sediments almost entirely of lake origin. We have already mentioned the top six layers of this huge deposition which are normally referred to as 'Siwalik divisions'. The river Sohan or Soan (*Sobhana* in sanskrit) started flowing on this plateau in the Pleistocene period when the trough was almost filled up and there was no lake in existence any more. There were periodic earthquakes and the region was tectonically very unstable and, under these circumstances, the older beds of the river often got pushed upwards and the river had to form a new bed and follow a new course at a lower level. The process having repeated itself on a number of occasions, a terrace-like feature is exposed on both the banks of the river. De Terra and Paterson brilliantly correlated the entire geo-morphological process with the advance and retreat of the Himalayan glaciation. Thus, in an indirect way the Alpine chronology could be imported by them to India. Since a large number of Palaeoliths could also be collected by them, a cultural succession of a kind hitherto unknown for India could be established. We shall briefly go into this study in the following pages.

De Terra and Paterson explored the region around Potwar and the valley of Kashmir. Several types of moraine debris, locally called 'Karewas' were identified in the vicinity of the Dal lake by these experts. It was demonstrated that the Karewas at a place called Malshahibagh in Kashmir record the earliest Himalayan glaciation. In comparison the Tatrot deposits, although not formed by glacial effect, were found to have remarkable petrological and also faunal similarity with the Malshahibagh Karewas. This led them to ascribe the Tatrot zone in Potwar as belonging to the first Himalayan glaciation. Further, upto Dhokpathan the fauna in Potwar did not contain *Elephus, Equus* and *Bos,* which appear suddenly in the Tatrot zone and continue onwards. This was taken to mean a Villafranchian faunal 'break' and hence marking the beginning of Pleistocene.

Subsequent deposits in the Potwar region have also been likewise compared with the glacial deposits in the Kashmir area and a tentative correlation was derived as regards to both the kind of deposition as well as their faunal contents. Interestingly enough, after the Potwar plateau was filled with the lacustrine deposits of Pinjaur, the river Sohan started flowing over this newly formed plateau. During the advance of the Himalayan glaciers a huge debri was pushed along the course of the glaciers and this was taken down further along the course of the river by the melt water as it descended to lower altitudes. Further, at the lower altitudes the glacial phenomenon is believed to have resulted in a period of heavy rain fall or pluviation. Thus, what the melt water could not carry could now be flushed out by the swollen river fed by pluviation. Hence, in Potwar region thick deposits (occasionally as much as of 500 meters thickness), made up of these concretized boulders, were laid down. The fauna recovered from these boulder conglomerates are designated typologically as Middle Pleistocene. These include open forest and moisture loving creatures such as elephants, horses, buffaloes, wild cattle and hippo-potamus, turtle and crocodile.

In the subsequent phase, there was a degradation in the river and, consequently, a large expanse of the earlier bed was exposed by erosion. This rhythmic oscillation seems to have continued with the alternate climatic cycles. This changing regime of the river is termed as aggradation (for raised water level i.e., pluvial climate) and erosion (for depressed water level i.e., inter-pluvial climate) phases. Several tributaries of the Indus are recorded to have formed 4-5 terraces representing these phases of climatic fluctuations. In the figure overleaf a simplified version of these terraces as described by De Terra and Paterson is reproduced.

reportoire at Bagor is perhaps one of the richest in the world. More than several thousand microliths have been recovered from this level and these are perhaps the tiniest of microliths so far known from India. Majority of these measure between 2 cm to 1.5 cm, and there are quite a few which are even smaller - measuring between 1 cm to 0.5 cm. The types finished on them are:

i) Thin blades with flat retouchings

ii) Blunted back blades

iii) Obliquely truncated blades

iv) Obliquely truncated with lateral backing

v) Triangles which mainly include scalenes

vi) Trapezes

vii) Broad trapezoids or transverse arrow heads

viii) Crescents and

ix) Points of blades

Flake types such as scrapers or burins are totally absent in this industry. Likewise, the crest guiding blades which otherwise are quite common in most of the known microlithic industries in India are also conspicuously absent in Bagor. The faunal discovery also is very revealing. Out of the total faunal recovery at Bagor, 72 perceant comes from Phase I and then there is a sharp decline. In Phase II onle 19 percent of the total fauna occurs, and in Phase III only 3 percent of the total fauna occurs. The animals identified are claimed to indicate almost 80 percent domesticated species and include sheep/goat, buffalow, humped cattle, pig, black buck, chinkara, chital, sambhar, hare, fox and mongoose. These even include some aquatic fauna like tortoise and fish.

In all, five burials form the other interesting feature of the site. Of these one burial is attributed to the Phase I occupational culture, three burial to Phase II and one to Phase III occupation. The Mesolithic burial was laid in extended position with the lower left arm resting over the body. The head was oriented towards the west. The burials in the subsequent phases show a complete change. The bodies are laid in flexed position (arms and legs folded like in a sleeping position) with the head oriented towards the east. Unlike in Phase I these burials contain large number of grave goods like earthen vessels, ornaments, metal objects and animal food. The famous hollow based copper arrow heads, with a pair of holes driven through the barbs, also come as grave goods. In the sequal it must be said that Bagor occupation can not be

visualized in isolation. It must have been repeatedly occupied until as late as the medieval period, otherwise it would not have earned the local name of Mahasati mound. The Mesolithic occupation, however, shows clearly a hunting emphasis which may have also maintained a suitable number of semi-domesticated animals in the area. The occurrence of stone paving on habitational floor would show an almost sedentary nature of the occupation.

Langhnaj

In Mehsana district of Gujrat, only a few hundred kilometers south of Bagor, occur several consolidated sand dunes along the western bank of the river Sabarmati. Sankalia recorded many microlithic sites and excavated Akhaj, Valasana, Hirpur and Langhnaj. Later, Subbarao has listed more than 80 such sites extending as far south as almost the northern border of Maharashtra. Langhnaj among these has received maximum attention. Several seasons of excavation conducted till 1963 were able to cover about 12,800 square feet and go upto a depth of 8 feet. Sankalia initially identified two main layers, the top 3 feet is dark brown in colour while the lower layer is light brown and merges with a kankary deposit which is full of lime nodules. Three distinct cultural phases were identified. Of these the earliest phase, Phase I, produced microliths and burials besides animal bones and some crude pot-sherds. In Phase II microliths continue but along with these two ground axes and a ring stone are also found. Phase III is marked by an increase in pot-sherds in addition to the microliths. A tanged iron arrow head, a stone bead and some fragments of stone querns are the other cultural materials from this phase. There is only one radio-carbon date available for both Phase I and II and it is estimated as 2040 $\pm$110 B.C. A large amount of microliths were collected from the excavation but more than 90 percent of these are waste material, cores and chips. Even parallel-sided blades form only 4.67 percent. The finished types are - blunted back blades, lunates, serrated blades, trapezes, scrapers, borers, notched flakes, serrated blades and burins. Associated with the microliths occurs a soft haematite piece with smooth rubbed surfaces, a rhinoceros shoulder blade with marks of striations and several hammer stones.

14 human skeletons have been found buried in a flexed position. In cases legs were folded backwards and tied before internment. The repeated finding of cut on the forehead led some experts to believe that they were probably cannibals. Various species identified from the faunal recovery are wild boar, nilgai, many species of deer, black buck, cattle, buffalo, rhinoceros, and some burrowing forms. The radiocarbon date of 2000 B.C. for a hunting-gathering

community within 100-200 km distance from a full blown Harappan settlement makes Langhnaj a very clear indicator of the fact that these communities might have survived with their primitive economy while being in symbiotic relationship of the neighbouring urban cultures. Honey and hunted meat along with the hide might have been much sought after in the urban communities. It is surprising how the hunters did not trade their produce for metal tools but may have got cereals only in exchange. Perhaps this explains the presence of some of the fragmented food processing pieces like grinders etc. at Langhnaj. The morals for archaeologists from Langhnaj are many fold but not demonstrative. But as anthropologists it will be wrong for us not to take cognizance of them.

i) Langhnaj proves that the cut and dried cultural chronologies that we are fond of constructing can be seriously misleading; i.e., Harappa should occur after the whole range of Palaeolithic, Mesolithic and Neolithic are altogether over. But in reality we find a pure Mesolithic occurring with the Harappans.

ii) Metals, their extraction and processing was held with either utter secrecy or was tied with a network of symbolic belief structure which made their trading beyond consideration.

iii) A simple hunting-gathering society in the neighbourhood of a rising urban civilization is not only an important requirement but can often play a determining role. A logical extension of this argument will be that it is very important for urban civilization to keep the neighbouring simple economies from evolving into cultures based on more efficient economy.

iv) A hunter-gatherer has his own symbolic world to fall back upon to explain his own technology until a time he is capable of organizing a larger group of individuals in order to internalize the need of intensifying his economy. The need of a technological evolution occurs at this point.

The evidence from ~~all~~ the three phases (the last one with iron) of Langhnaj and Bagor leaves no doubt that such a transformation had never occurred among these dune dwellers of western India.

3. Central Area

The area which includes Madhya Pradesh along with its extension in Uttar Pradesh provides another region of Mesolithic occupation of considerable importance in India. Here, unlike the Western Zone, there are many instances of Mesolithic occupations occurring vertically above Palaeolithic habitations.

These provide an insight into the fact that the hunting niche is not substantially changed from the Palaeolithic phase. May be now only selected species were intensively exploited. But, here again, the faunal evidences are not very helpful in identifying these species. Probably sheep/goat comes closest to being numerically abundant on a very general estimate.

Bhimbetka

At this site there are many rock-shelters which yield microliths in the floor and paintings on the walls and the ceilings. At III F-23 the microlithic horizon starts with a rich geometric industry (if a microlithic occurrence contains triangles and trapezes it is considered **geometric** and is believed to be younger than the non-geometric industries) but does not contain any pot-sherds. The next group contains painted wheel made pottery and copper objects and hence can not be considered Mesolithic. The microlithic horizon is believed to be roughly at 5000 B.C. date and contains a number of human burials as well. The burials are extremely fragmented and show medium range characters unlike those at Bagor. It is important to note that at Bhimbetka the shift of raw material to chalcedony occurs first in the Mesolithic level. The microliths are much larger in size and it is quite usual to get 3-4 cm long slender lunates besides numerous fluted cores and parallel-sided blades. There is a suggestion that during this period possibly there was an attempt of building a screen or wall by piling stone upto a hight of about 3 feet near the mouth of the cave towards the side wall.

Adamgarh

At these rock-shelters and immediately outside some shelters nearly 18 trenches were dug. Microliths have been uncovered in almost all of them within first 150 cm. The top 20-60 cm of course is usually sterile and constitues of rock debris and soil. Lower layers yeilds Palaeoliths of a large variety of types that we have mentioned earlier. What is interesting about the Adamgarh microliths is that they are constantly associated with pottery fragments and rich animals remains. At least 14 different animal species have been identified of which dog, buffalo, sheep/goat and pig are identified as being domesticated. The two radio-carbon dates available from this layer are 895 $\pm$105 B.C. and 5500 $\pm$130 B.C.

Both these dates are incongruous if we have to accept Adamgarh microliths as representing an early Neolithic economy. In terms of tool types identified we have blades, lunates, obliquely blunted knives along with triangles and

trapezes. But we also have such flake types as side scrapers, borers, points and occasionally burins prepared on exhausted cores. Although more crudely finished than Langhnaj, chrono-culturally, Adamgarh would seem to fit with this Gujarat group rather than being the earliest Neolithic of this zone.

Sarai Nahar Rai

Mirzapur district forms the last Vindhyan limits before one proceeds further north to enter the Gangetic valley. Several rock-shelters with paintings, presumably attributable to the Mesolithic culture, have been recorded here from as early as the end of the last century. Of these, two rock-shelters at Lakhania are both excavated and documented. 17 human burials are also recorded. It will appear that there is both an earlier non- geometric phase as also a geometric phase stratigraphically maintained at this rock-shelter.

In the Allahabad-Pratapgarh region several horse-shoe lakes seem to have been created during the early post-Pleistocene period. Apparently the region is formed by the early alluvial spread of the Ganga and the various streams from south which meet the Ganga. It is estimated that the habitation at the site extends over 2000 sq mt. This seems to be a single occupation site similar to a couple of more like Mahadaha and Dam Dama found in the continuous region. The excavation uncovered a living floor of 5 X 4 mt with four post-holes on the four corners. The floor is made of burnt clay lumps and several fire hearths - some with charred bones near them. Faunal types identified include sheep/goat, buffalo, cattle, elephant and tortoise. Many amongst these are also suspected to be of domesticated type. 13 human burials in extended form with head towards the west form one of the most important features of this excavation. In one of these a microlith was found pierced in the rib. A total number of 168 microliths are reported but all of these are found in association with the habitational debris. Instead, most of these are collected from the surface. The types identified and their relative frequencies are as follows:

Blade	27.97	Point	17.86
Triangle	11.90	Trapeze	4.17
Lunate	16.67	Crescent	2.39
Burin	4.17	Borer	1.78
Piercer	5.36	Arrow head	4.76
Utilized flake	2.98		

Although there is some problem about the types and their identification, there should be no doubt that here we are dealing with a geometric industry which also maintains several flake tool types.

In association with the burials occurs a pot which is round, ill-fired and coil structured. There are a series of radio-carbon dates available and most of them being on uncharred bones could not be very reliable. The oldest of them is 10,345 ± 110 B.P. which make it 8395 B.C. On the basis of some of the younger dates being more consistent Agrawal claims that the site should be more logically 1000 B.C. only. It is true that the cultural indicators would seem to put the early Holocene as improbable but at the same time a 1000 B.C. date (which incidentally almost marks the period of arrival of iron in the Gangetic plain) would also seem to be pushing it too far.

4. Eastern Area

The area covering most of southern Bihar, Orissa, and West Bengal, otherwise identified by us as Chhotanagpur region, has thousands of reported as also so far unreported microlithic occurrences. None of these has any excavation report except from Kuchai in Orissa and Birbhanpur in West Bengal. Most of these microliths are fairly large in size and are occasionally prepared on black chlorite stone or even fossil wood. Geometic forms are either absent or rare in most of the cases and constitute blades, lunates or points along with burins or side-as also end-scrapers on fluted cores and flakes.

At Kuchai a microlithic horizon without any ceramics was reported from the levels below a Neolithic horizon and both these are not very far from areas rich in Lower Palaeoliths as well. In Burdhwan, Bankura and Purulia microliths have often been found in association with Black-and-Red ware pottery, ringstones or at times even iron slag.

Birbhanpur is a site near Durgapur railway station and is situated on the middle terrace of the river Damodar. It was excavated by B B Lal in 1957. Over the basal decayed sandstone is a thick layer of mottled silty sand which is believed to be caused by the *in situ* weathering of the underlying rock. This is capped by a lateritic gravel. Microliths occur on the top of this layer. This is further covered by about 60 cm of sand earth of light brown colour. Geomorphological studies were done of these soil layers and on the basis of them it was argued that the lateritic gravel bed perhaps marks the last of the wet spasm during the close of Pleistocene. Thus, it was argued that the

implementiferous layer was caused during the increasing aridity of the early Holocene. Some post-holes were also claimed to have been discovered but no hearth, bones or human burials could be found. Typologically the Birbhanpur industry seems more archaic as big flake and blade tools dominate it. Almost 40 percent of the total industry is composed of scrapers, borers and burins taken together. Lunates form the main microlithic type and triangles and trapezes are conspicuous by their absence.

6. Southern area

One of the biggest concentrations of mircolithic occurrence from this zone is known from Karnataka. Just between Krishna and Bhima rivers in Shorapur doab alone 25 microlithic sites are reported by Paddayya. Tools recovered and analysed from these sites are more than 10 thousand in number. These microliths are extremely slender and long. Mostly these are flat with hair-thin lateral retouchings. Those with triangular section are often retouched abruptly and compare well with the micro-gravette points of Epi-Palaeolithic of Europe. Crescents, borers and burins are the other usual types. Triangles and trapezes are either totally absent or insignificantly known.

Sangankallu in Bellary district has been known as a famous prehistoric site since the beginning of this century. Subbarao excavated this site in 1949. In 1965-66 Sankalia undertook a small-scale fresh excavation on the foot of the hill. Since the Neolithic in this region is dated around 2500 B.C., the microlithic group is estimated around 3500 B.C. These microliths from the pre-Neolithic layers are essentially composed of flakes, both utilized and retouched. Blades are surprisingly not reported at all from this layer although there are many lunates identified.

Teri

A group of 11 sites of microlithic clusters occurs along the fossilized sand dunes in the Tinnevelly district of Tamil Nadu. These are usually referred to as Teri sites. It is believed that older transgressions of the sea had caused the formation of these sand dunes. It is argued by Zeuner that the sea used to have a height of more than 7 metres than the present sea level during the early Holocene and during the succeeding regression dunes at three respective levels were created nearly as far as 10 km inland from the present day coast. One of these transgression beaches has also been dated by radiometric technique to nearly 5000 B.C. Microlithic occupation took place once these dunes were in this process of consolidation. Microliths from this area were

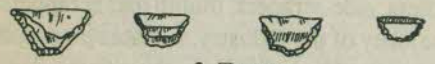
first recovered by Foote. Subsequently Aiyappan made a substantial collection from one of these sites called Sawyerpuram. Finally Zeuner made a detailed report of these sites.

The industry is prepared on chalcedony, quartz and fossil wood and shows one of the most primitive features in typological sense. Disc or discoid cores, flakes shaped into various kinds of points, side scrapers, thumb nail scrappers and borers, besides burins form the majority of the industry. Lunates prepared on flakes and points and arrow-heads prepared by bifacial pressure flaking are some of the other significant features of this site. Microlithic types include lunates, backed blades and pen knives besides numerous blades and fluted cores. It has been argued that the Teri industry shows closeness to Sri Lanka microliths in several significant features -- specially in the tradition of preparing bifacially pressure flaked points. The Bandarawela factory site in Sri Lanka in this regard is specially mentioned

It can be seen from the above that a pure microlithic survey of India would seem to indicate a widespread tradition of this lithic technology. It is a different matter whether all these can be counted to form a picture of Mesolithic India or not. A true Mesolithic phase in India is clearly demonstrable in Central and Western zone besides at Teri but each one of them has its own individuality. With increase of aridity, forest covers opened up and grass-l and expanded in certain areas (Birbhanpur, Teri, Sarai-Nahar-Rai) and here the adaptation strategies show quite different direction of development. In contrast to Langhnaj, on the one hand, at Bagor and Tilwara one can see the examples of quite specialized variety of adaptation. Adamgarh and Bhimbetka might be as late as Langhnaj but emphasis on animal domestication in this region can not go entirely unnoticed. In all probability South India had an entirely independent development of microliths and hence forming its own regional characteristics.

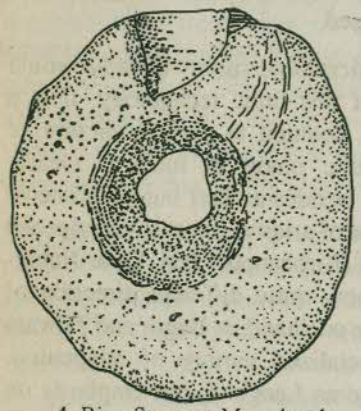
Numerous rock paintings studied from this period show the emphasis of fishing, honey collecting, net trapping and similar small-game-based economy. Inter-group warfare is empirically demonstrated in the Sarai-Nahar-Rai skeleton but rock paintings also, in some instances, show the factor of human aggression having evolved during this phase. Wild seed collection and partial sedentism seem to be also indirectly indicative from the various archaeological evidences from some of these sites. In short, a stage was almost being set for man to enter into the settled and productive economy.

1. Lunate.

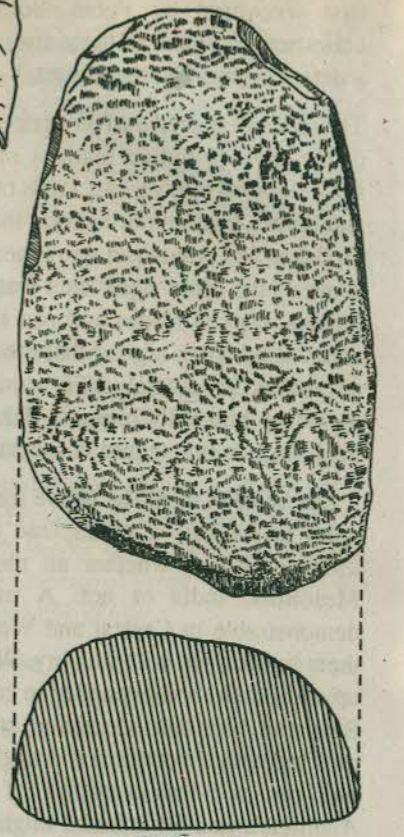


2. Trapeze.

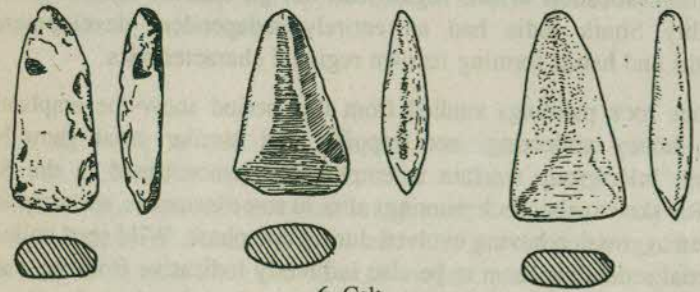
3. Triangle.



4. Ring Stone or Mace head.



5. Grinder.



6. Celt.

Mesolithic and Neolithic are fairly overlapping in both typological as also chronological sense. Nos. 1-3 are Mesolithic and 4-6 are Neolithic.

CHAPTER IX

Neolithic

1. General Considerations

As the youngest period of stone age history of man Neolithic has always been understood as a well defined stage. It is not surprising, therefore, that antiquities were sought merely to fill the grand definitional frame till as late as 1959 in India. Pre-defined types usually referred to as celts whenever found, no matter even if from surface, were taken to locate a Neolithic site. The usual techno-morphological analysis of these types formed the ultimate in understanding the culture. This was more or less similar to the methodological basis used for the preceding periods in prehistory.

Around 6000 B.C. numerous sites in West Asia started showing certain features which soon got identified as discriminant characters for Neolithic. These features can be briefly summarized as follows:

I. Man becomes sedentary in nature and hence develops interpersonal relationships to consolidate a form of cooperative existence. Thus, the social organization has to, by necessity, become more complex than earlier.

II. This change, it is argued, becomes necessary because of a change of economy. This change in economy is taken to be caused by man getting land-tied because of adopting agriculture.

III. Since agriculture involves two entirely new areas of interaction with the natural environment, the media (artifact) through which these interactions are accompliced are counted as Neolithic attributes. These attributes are:

a) Large areas of vegetation cover had to be cut and a field for cultivation had to be tilled. It is believed that the Neolithic celt was evolved to meet this new interaction. A hard and compact rock is selected and **flaked** into an axe or adze. Then the sharp edges of the intersection of flake scars are knocked off in the manner of **pecking.** Finally, the tool is rubbed on a hard rock with water and sand, so that a metal-like smooth and sharp axe results. This final step is referred to as **'grinding and polishing'** technique.

b) If cultivation is to be accepted as a gainful economy, it requires storing of

a harvest for regularity and security of supply. Thus, management of land and also its produce suddenly become a very pivotal issue for establishing the new economy. Fire burnt earthen pots are believed to have evolved at this stage in order to fulfil the primary advantage of the economy.

It is not surprising, therefore, that archaeologically speaking, ground celts, pot-sherds or permanent dwelling structures, either individually or together, whenever found are taken to indicate a Neolithic culture. The large number of Neolithic finds, that various archaeological explorations till 1950 have yielded, were given a regional treatment for the first time by V D Krishnaswami in 1959. He divided Indian Neolithic culture into four geographical zones purely on the basis of archaeological features like the techno-morphological characters of the celts, microliths or ceramics. The zones identified are:

(a) *The Northern zone:* In which Krishnaswami could include the then known only site from Kashmir called Burzahom.

(b) *'The Eastern zone:* Till then this zone was identified only on the basis of the surface-collected celts from Bihar, Orissa, West Bengal and Assam.

(c) *Central and Western zone:* The Malwa region and northern Maharashtra had some excavated sites till then and these were included in this zone.

(d) *Southern zone:* Till the time of Krishnaswami's work both Brahmagiri and Sangankallu were excavated. These, along with Pilkihal and other known sites, were included in this zone.

In brief, this zonal analysis attempted to show that the northern zone was characterized by pit-dwelling and pointed-butt celts; the eastern zone by varieties of shouldered celts; the central and western zone by microliths and pot sherds more often than celts and finally the southern zone by celts which often have broad butt-end.

Sankalia, who was himself involved in archaeological research in the last two zones, had rich first-hand information of the Neolithic and Chalcolithic sites from northern Maharashtra and Karnataka. On the basis of this knowledge Sankalia in 1962 took the liberty for the first time to claim that in India we have a large majority of sites which do not fit in within either a pure Neolithic or a pure Chalcolithic picture and hence these could be identified as Neo-Chalcolithic sites. Most of the sites Krishnaswami had counted within his *c* and *d* zones were now re-classified by Sankalia as **Neo-Chalcolithic**. Sankalia classifies the Indian Neolithic as follows:

(A) Pure Neolithic

1. This included the whole of eastern India comprising Assam, Bihar and Bengal. These are characterized by ground axes with shoulders and very little pottery.

2. This included the Kashmir sites. These are characterized by ground axes, bone tools, pottery and pitdwelling.

(B) Neo-Chalcolithic

1. South India comprising western Andhra, Karnataka and Tamil Nadu. The main characters of these sites include ground stone tools, microlithic blades, handmade pottery and round huts on hilly terraces. Most of these sites also include one or two pieces of metal.

2. Early Baluchi cultures, e.g., Kili Ghul Mohammad which show much developed habitational structures and ceramics - often wheel made. Ring-stones, saddle and quern, and celts are found in plenty.

3. The site of Bagor in Bhilwara is counted as forming a separate Neo-Chalcolithic group. Microliths, copper arrow-heads, pottery and huts with wooden posts characterize this site.

It will not be difficult to appreciate that the real problems of Neolithic India have not been adequately understood in most of these attempts. Even if we go by the attribute analysis that is usually done we cannot fail to notice one very significant point. That is, while almost all the Neolithic sites in India known till date go at the most to a date of 2500 B.C., Harappan culture which is not only Chalcolithic but a well developed urban metropolis starts around the same date. To any archaeologist tuned to the system of cultural chronography this peculiar situation in India, specially in view of the numerous evidences of 8000 B.C. to 6000 B.C. Neolithic sites from both the western and eastern gateways of the country, would simply mean that we are yet to discover our pre-Chalcolithic phase of Neolithic for majority of the region of the country. We, as anthropologists, also cannot deny the possibility of a future discovery but surely what has been discovered so far needs an adequate explanation.

Here we need to delve into the theories of social formation. If we concede the fact that agriculture is totally labour intensive economy, one can not visualize this transformation merely with the adoption of technology. Labour management with adequate consolidation of the relations of production, in that case, will become a much more important determinant than technology. We have

claims of domesticated seeds from as early as Upper Palaeolithic from Isreal but still we do not have a Neolithic culture developing with these seeds. Similarly axes are known from Maglamoisian and Compignian (both Mesolithic of North Europe). Yet these areas were the last to adopt Neolithic. Again, ceramics are known to have been developed much earlier in Japan than the emergence of Neolithic there. In other words, we have to concede a stage of varying duration which Julian Steward had visualized as a stage of incipient farming. Incipient farming has to be concieved as a reasonably sedentary group taking to low labour force oriented farming conjoined with husbandry or hunting depending on the ecological potentiality of the regions of adaptation. Most of the labour management in such a case has to be kinship based. Even then, a fluidity as also mobility of the community must have been a regular feature to avoid exhaustion of resources.In this transformation the factor of demography too can not be neglected. It is a possibility that whenever demographic pressure increased within a less hospitable ecology the rate of transformation to full blooded Neolithic was accelerated. For most of India, therefore, we have to accept that such a transformation was actually much retarded primarily because of a lack of demographic pressure or ecologic pressure or both. It is important at this point to emphasize that all evidences from Indian Neolithic would tend to indicate that:

It is not technology transforming the super structure but the other way round as far as majority of Neolithic evidences from this sub-continent go.

2. Borderland evidences

A study of Indian Neolithic period needs to be preceded by a hurried survey of the two borders which during historical period have acted as the main corridors of human migrations. The western border is formed by the largest district of Pakistan called Baluchistan and parts of eastern Afghanistan. This area is known for its extreme climate and scanty rain fall, yet a large number of Neolithic sites with pastoral base are known to have developed in this region between 3700-2600 B.C. This period of one thousand years of settlement of small groups is recorded in the form of small mounds all over this borderland. We might look into the significant features of some of the most important of these sites.

Kili Ghul Mohammad is a small mound of less than 500 sq mt near the city of Quetta which was excavated by Fairservis in 1950. Three distinct cultural phases were identified within a dig reaching almost a depth of 11 metres. The lowest 5 metres out of this, identified as phase I is characterized by remains

of hut made of pise, wattle and daub, numerous microlithic blades and some bone tools. Bones of sheep, goat and cattle are known in good number and these have been identified as domesticated. No cereals have been found although evidence of cereal collection should be indicative from the sickle blades identified. A solitary piece of limestone slab found is suspected to be a fragment of a grinding stone. Bone points and awols are also significant. Absence of both axes and pottery put this culture as purely a seasonal camp of a pastoral community. The subsequent phase clearly demonstrates an internal evolution of this form of non-farming Neolithic into a fairly stable Neolithic culture with wheel-made pottery and metal use albeit in a limited way.

Damb Sadat is another mound lying only 12 km south of Kili Ghul Mohammad. It shows a continuation of form right after where Kili Ghul Mohammad ends. Anjira, Rana Ghundai and many other mounds show this common feature of a Neolithic growing out of a pastoral base. It is needless to emphasize that the youngest phases of all these finds lie almost on the threshold of Harappan Chalcolithic in chronological sense. No wonder that even in the earliest phase of Kili Ghul Mohammad one is surprised to find a precious stone bead.

Mehergarh

In 1977 the French archaeological exploration reported a very significant and widespread site near the Bolan pass in Baluchistan. This site, called Mehergarh was excavated by Jarringe and Lechevallier since then. It is probably the closest to Indus plain Neolithic sites known till today. Nearly 11 meter deep occupation debris have been excavated and in all 7 archaeological periods are identified. Of these periods I-III are considered as Neolithic. A radio-carbon date of 5100 B.C. has been obtained from 5 concurrent results from the earliest period. Thus, Mehergarh is undoubtedly one of the oldest Neolithic occurrences from this region.

A mud brick settlement of rectangular houses with multiple rooms forms one of the most spectacular evidences of this period. Microlithic blades are the only known tools from the lowest level. These include lunates, trapezes, triangles and unretouched blades. Some of these microliths have bitumen adhering to them. In period II a set of ten microliths has been found hafted in a saw like manner with bitumen used as mount. This can be taken to indicate that the microliths in period-I, which also have bitumen sticking to them, must have been also used likewise. Although no proper ceramics occur in this period, remains of baskets with bitumen coating have been found.

Only one ground axe has been recovered from a burial but numerous others found from the surface can help us to believe that grinding -polishing as a technique has already been established at this early date. Similarly hammer-stones, ring stones, querns and grinding stones must have also been used although we have poor evidence of this from period I. Some of the most surprising features of Mehergarh-I besides the habitational structures are two tiny grave goods - one copper bead and some turquoise beads. This proves at once the choice of items sought and a trade like phenomenon existing much before the time we have accepted them in existence earlier. That these perferences become a regular feature nearly 2000 years later in the Harappan urban centers, would therefore be not surprising at all. In period II, this is further added by one perforated pendant of lead and several beads of Lapis-lazuli. The subsequent phases show the introduction of handmade and wheel made pottery without much change in the Neolithic cultigens associated with it. Finally it is demonstrated that wheat, barley, date and cotton were domesticated. Animal bones found are predominant in sheep, goat, cattle and bufalloes. All estimations tend to indicate that these were domesticated species.

Mehergarh is, therefore, a spectacular discovery of a community with rudimentary evidences of all those attributes and achievements which had been taken as prime mover to urban civilization - but occurring nearly 2000 years earlier within a culture which essentially was merely stone using and pre-ceramic in character.

3.Burzahom

Not very far from Srinagar on the second terrace of Jhelum at least two Neolithic sites are known till date. These are Burzahom and Martand. The former, which has been excavated now for several years, has yielded at least 3 archaeological periods of occupation. A large number of similar other sites have been recorded from all along the Jhelum from Anantnag to Pampur and also elsewhere in the Kashmir Valley. It is believed that these sites are all similar to Burzahom.

At Burzahom 16 dwelling pits have been exposed and all of these belong to the earliest period (I). Most of these are circular to oval at top although at the bottom they tend to be square or rectangular. One of the largest of these pits measures 2.7 meter in diameter at the top. At the base it expands to 4.6 meter, and its depth is nearly 4 meters. A stair has also been cut on the earth to enable one to reach the bottom. The ground on the surface shows a number of post-

holes which are believed to have supported a thatched cover on the pit. Since the Neolithic people used to live in the pit and also had fire burning on their living floor, the roof had often been burnt down. Around one pit as many as 45 post-holes have been found showing the number of times the thatched roof may have been destroyed and re-erected. The radio-carbon date for the oldest layer is 2375 B.C. The youngest period (III) goes upto 1500 B.C., i.e. the entire occupation has a duration which is parallel to the rise and decline of Harappa.

The cultural features of Burzahom period I appear quite significant. These people buried their dead in a variety of methods. Some are found buried in crouched position, some in extended form and there are yet some which represent secondary internment. The skeletons were often covered with red ocher. In one case the evidence of trepanning of the skull proves their possible knowledge of some kind of primitive surgery. Finally, in many cases either a full wild dog or selected bones of dogs are found buried with the human skeletons. The pottery from phase I is represented by hand made, coarsely finished, ill fired pot sherds only. The only near complete shape found represents a 26 inches high jar with cylindrical neck and a flaring lip with a round bottom. It shows marks of woven mats on its surface. The celts recovered show a wide variety of function and forms. These include axes, wedges, chisels, adzes, hoes, pick and perforated picks, besides ring stones, sling stones and querns. The bone tools found are equally rich. Harpoons, eyed needles, points and arrow heads are some of the most commonly occuring types among them. Microliths are conspicously absent all through. Rectangular stone knives, with 2 holes driven along one of the long borders, have been termed the **harvesters**. These types are not known from anywhere else in India but are quite common in north Chinese Neoliths. Domesticated plants have so far not been reported from any of these Neolithic layers.

The borderland consideration briefly summarized above clearly shows two distinct varieties of Neolithic emerging at the southern and the northern parts of our western door step. It is needless to emphasize that these have neither chonological nor any typo-technological similarity with each other.

In the eastern gateway, however, the evidences are not so wide spread. In Thailand one of the most spectacular discoveries has come from the excavation of the spirit cave. Large number of fruit, nut, tuber and creeper crops seem to have been domesticated in this region much before cereals are domesticated. At Ban Kao, Ban-Chiang and Non-Nok-Tha even rice and millet seem to have been domesticated from as early as 8000 B. C., if not

earlier. Chipped and ground axes, chord marked handmade pottery and numerous hunted animal bones are the other important finds from these sites occurring over a limited geographic zone. Habitational structures or microliths or for that matter bone tools are conspicuous by their absence.

Within the above back drop if one sets out to study Neolithic in India one is really surprised by the total contrast that the rest of India offers. We will briefly look into some of the important excavated sites to illustrate this point. In the eastern sector we have just about four excavated sites of which only 2 yield a series of radio-carbon dates. We might hasten to add that Neolithic celts from surface are by no means scanty. Large number of these tools have been recorded from almost all the 4 states that comprise this zone (Bihar, W.Bengal, Orissa and Assam and adjoining states).

4. Chirand

In the gangetic plain Neolithic sites are known from Allahabad and north Bihar alone. Chirand is an early historic mound in district Saran (Chhapra). There are three phases identified by the excavators. Phase I out of these is metal-free and hence attributed to the Neolithic period. The oldest Carbon-14 date recorded so far is 1755 B.C. and these dates being not from Phase I, it is generally believed that Neolithic occupation at the site must have taken place well within 3rd millenium B.C. i.e.(around 2000 B.C.).

The main feature of this site is an overwhelming amount of bone and antler tools. In fact actual celts from both Phase I and II combined are only 4 in number. In addition to these a developed microlithic industry of blades, lunates, points and borers is also present. The houses unearthed are circular with 2 meter diameter with bamboo and mud plastered walls and paved floors. It is suggestive that initially pit-dwellings with thatched roofs were used but later on they took to overground dwelling structures. In one of these huts a cluster of ovens with a longitudinal passage was unearthed. The pottery is extremely well made and may have been prepared on turn table. Red, grey, black and Black-and-Red ware occurs in all the three phases though phase I is dominated by a burnished red-ware which is given some criss-cross designs as well. Different types of bowls, footed cups, channel spouted as also narrow spouted vessels constitute the types. Several terracotta objects form another important feature of this site. These include besides beads, bangles and wheels, several bulls, birds and serpents figurines.The bone tools, which are perhaps the richest of any prehistoric find, include a variety of picks, scrapers, eyed needles, bodkins, and pierced batons. Harpoons, or for that matter,

fishing hooks are not known so far. Evidence of domesticated wheat, rice, *masoor and moong* seems to be a very significant feature about this eary Neolithic settlement. Elephant, rhino,buffalo, ox, stag and deer remains are also found in plenty but whether these or any specific group from these were domesticated is not known.

5. Koldihawa

South of Allahabad in the neighbourhood of the Mahagara-Dam Dama cluster occurs this Chalcolithic mound which has yielded a Neolithic layer dated to almost 5440 B.C. This site drew a great deal of attention primarily because domesticated rice in pure Neolithic group has so far not been recorded from such an early date.

It seems that several strata of circular huts marked by post-holes have been identified underlying a Chalcolithic deposit. Microlithic blades and ground stone axes form the main tool kit besides some bone tools. Along with these several crude, hand made and ill fired pot-sherds also occur. These pot-sherds carry chord impressions or basket marks besides having rice husk sticking within the clay in some instances. A distinctive feature of this site is the claim of a cattle pen with post-holes at the corners and hoof impressions on the floor. The animal bones identified are sheep, goat and cattle besides some hunted wild forms. There is a possibility that this early date is not finally confirmed. In such a case Koldihawa would, at best, be taken as contemporary to Chirand.

6. Kuchai

Within the highly consolidated lateritic Mayurbhanj plateau and not far from the river Burhabalang Thapar excavated a Neolithic site at Kuchai. Neolithic axes, faceted hoes, chisels, mace-heads and grinding stones are the Neolithic types discovered. Some pot-sherds of red colour constitute the ceramic form. The tools, including the mace-heads, are much smaller in size than the Neoliths known from further south in Andhra or Karnataka. No radio-carbon date of the site is available.

7. Daojali Hading

Further east and in the north Cachar hills another type of Neolithic adaptation is recorded from Daojali Hading. Unfortunately, this small scale excavation conducted by T. C.Sharma could not yield any evidence of habitation structure, although a large collection of ground and polished celts besides

grinding stones and pot-sherds have been described. No microliths or bone tools are known from this site.

The celts were mostly shouldered at the butt end and had the border ground sharp. Sharp angular shouldering in the celts from these hilly Neoliths led many to doubt their antiquity. It was argued that such sharp cutting of stones can only be done by metal and hence these must be belonging to a much younger date. This controversy could be partially settled by the excavation of Daojali Hading, which obviously does not show any metal age features. Further, some experts could physically demonstrate how a sliver of bamboo can be expertly used to cut the local soft stones (jadeite). Some slabs of stones with grooves on them were also found in the excavation and this was explained as stones on which grinding of the stone axes was done. The ceramics recovered are extremely fragmented and hence could not be used for shape reconstruction. The fabric is coarse and shows evidence of having been hand made and ill fired. Almost all sherds carry cord impressions. The absence of microliths, bone tools and artificially constructed habitation in addition to the occurrrence of the distinctive variety of celts led many specialists to believe that Daojali Hading may be representing a break-away group from Yunnan who developed a specialized adaptation to this high rain fall strip in Meghalaya. In the generalized area around Daojali Hading two more sites have been excavated. The cultural material retrieved from these sites (Sarutaru and Marakdola) is also not different from the Daojali Hading material culture. There are some radio-carbon dates available from these later sites but these show almost a B.C./A.D. border date for these Neolithic occupations.

Most of the Neolithic evidences from the rest of India are known from the region lying south of Narmada. Although Krishnaswami identified two separate zones within this area - the central and western zone and the southern zone, we might treat the area as a single zone because there are stronger similarities in the whole area than differences within. Prehistoric sites spread over the entire area show a Chalcolithic culture which lies immediately above a Mesolithic layer. In most cases there is a layer or two of pre-metal industries found sandwitched between the Mesolithic and the Chalcolithic. Many specialists do not find it very logical to isolate these few layers to develop a picture of Neolithic for the area. Instead they would like to designate the total culture as **Neo-Chalcolithic** or **Deccan Chalcolithic** or even **Deccan Neolithic**. The latter name is preferred by some because the metal component of these occurrences is rather insignificant. The radio-carbon dates of these finds range from 2400 B.C. to 900 B.C. So far nearly two dozon major sites

have been excavated from this whole region. But several more of these sites are recorded. Of the plant remains evidence of millet, horse gram, legumes, date palm; and Bajra are the common varieties known from these sites.

Deccan Neolithic

At Tekkalkota (Karnataka) 19 remains of small circulars huts with 3 meter to 5 meter diameter were recorded. These ranged from 1780 B.C. to 1540 B.C. in date. Small and big wooden posts were erected in some cases while in others no such post-holes are seen. Natural boulders and rocks scattered on the surface have been taken advantage of to hold the structure. Burials are found under the floor of the house. Sometimes bodies have been interned within urns. The granitic boulders near the site show some art execution by pecking and brusings, and also at times painting with red ocher. A bull, deer, gazelle or stylized human figures are some of the usual depictions recorded at many of these Andhra and Karnataka sites. That these art works are of Neolithic period is supported by a grey ware ceramic lid found from Tekkalkota excavation. A bull, a cobra and two antelopes are executed in this lid by puncturing the clay when it was leather-hard. Animal bones recovered indicate domesticated cattle, mainly buffalo, goat, sheep and dog. Experts have even opined that anchylosis of the hock joints noted in the cattle bones might indicate their use as draft animals. Brahmagiri, Sangankallu, and Hallur in Karnataka, Piklihal in Andhra and Paiyampalli in Tamil Nadu are some of the well known sites from southern Neolithic zone which show similar features. All these sites show rather scattered habitation with a fairly interesting ceramic content but otherwise with mainly microliths. Neolithic axes or saddle and querns are found but in frequencies as one would expect in a Neolithic settlement. The ceramics are dull grey in colour and are as a rule hand made. The shapes seem fairly exotic and do not match the personality of the culture. There are a variety of spouted vessels, some of them with hollow stands and low down external carination. Decoration as a rule is either missing or very insignificant. Some of these sites besides yielding what has been described above show large areas covered by cow dung ash. At one site (Utnur) even the hoof impression from cattle pen ash mound has been identified. These evidences also led to the usage of the term **'Neolithic Ash mound sites'** in the literature. Evidently such evidence came quite useful in interpreting a cattle keeping pastoral economy for the Neolithic in south India. At this stage of our knowledge we can simply point out that even if this is true it does not apply to all the sites known from this zone.

Interestingly enough the character of the sites shows no change either in habitation or the total material culture even after the arrival of metals. In one of these sites (Tekkalkota) a gold toe ring appears with these microliths and celts. In fact if there is change it is more towards a decline in the ceramic variability. A true change indicating a more complex social organization is indicative only after the arrival of iron.

Since culturally such an unchanged status inspite of the knowledge of a new and better technology is untenable, one has to seek an alternate explanation for them. The size of the habitation and their nature of occurrence can be taken to indicate that these were relatively small hordes of Mesolithic hunters who settled around the rocky plains primarily because the lower levels were relatively more forested. The attempt to settle down by these hunter-gatherers was more of seasonal nature and they did not domesticate any seed crop for long time. Their main carbohydrate source, in all probability, was from asexually reproducing plants and their roots. Those among them who moved to the lower valleys did so with the power of both their large demographic strength as also their polished stone axes with which they could clear the dense forests. Navdatoli, Diamabad and Inamgaon in Maharashtra might be representing such break away branches who developed stable villages albeit with some copper items intruding in them. A conservative estimation for this change can be put to 1700 B.C. A third group whose pastoral economy seems to be archaeologically demonstrative by the ash mounds in Andhra may have had connection with the north western late Harappan region from where the economy with cattle emphasis was brought and re-adapted to the arid plains in the form of pastoralism. The route of this connection that is usually alluded to by some is south Gujrat, north Maharashtra, east Maharashtra to northern Karnatka.

The economy within which these people sought their adaptation was not the least conducive to the development of large scale agricultural settlements. Even today these regions of Karnataka receive less than 25" rainfall in a year. The tropical monsoon exhausts itself either on the western or eastern coast (depending on the time of the year) and therefore an arid area develops around the region which is equidistant from both the coasts. These isolated groups must have had relationship with each other based on either marriage or economic exchange. Cultivation of seed crop is recorded only around 1600 B.C. and here too such sturdy lentil crops were selected which require small patches of land only. *Ragi and Hulgi* are the millets which are found commonly in them. Apparently this adaptation brought virtually no change

in the demographic picture; at least not strong enough to call for intensification of economy, because in that case the tool-kit would certainly have shown evidence of a corresponding change. Plough agriculture, therefore, had not developed among these hill dwellers.

It is a strong likelihood, specially in view of the fact of rather late continuation of these hill habitat and economy, that a symbiotic relationship with higher cultures might have come into being. The relationship of the hill dwellers with the agricultural group can take various shades of expression. A purely economic contact for exchange is what the settled group ideally desires and to keep the process ongoing the peasants would like to see that the hill dwellers do not change their economy. For the hill dweller getting cereals in exchange of forest produce keeps him fed on the products of different ecology and different technology. He enjoys the fruits of an altogether alien system. Import of the product of higher and different technology prevents the hill dwellers from internalizing the surplus advantage of agriculture. It is, therefore, not surprising that we see virtually no change in the character of these sites for nearly 2000 years. Even after metal appears on the scene the habitation or the cultural reportoire remains unchanged. This might be argued as caused by the fact that the basic economic persuits of these people are not affected by these imports. Under such a condition items imported always developed exotic or ornamental value. The isolated occurrence of a gold ring here or beads there in Deccan Neolithic area can more plausibly be explained through the above argument.

CHAPTER X

Chalcolithic

1. General Considerations

A discussion of Chalcolithic India as a chrono-cultural phase becomes difficult because of the acute incongruencies recorded between various regions within the country. To an anthropologist, however, these incogruencies are mainly caused by our methodological short-sightedness. When we are dealing with culture change we need to keep in our mind that culture seldom changes on its own initiatives. The multiple imperatives operating within a community are the ones which act as the prime mover. Thus, if a community seeks adaptation within a not-too-favourable ecology and can keep its population density from changing, then its progression towards a complex social structure can be enormously retarded. Looking at the available geo-climatic data from the western coast it would be quite clear that around 3000 B.C. the sea level was up by a minimum of 3 metres and this more or less coincided with the humid C-palynological zone identified at **Pushkar.** It is around this time that Kili Ghul Mohammad and Damb Sadat occupations took place in Baluchistan region. Periods of dry phases have since then been occurring at increasing frequency. Finally, around 1000 B.C. in the entire region from Baluchistan including southern Afghanistan to almost Iran desert, conditions overpowered the stretch. In rest of India this dry phase must have considerably increased the steppe cover and created numerous lakes. Who discovered the first metal, copper or how he harnessed it within his culture will perhaps never be known but we will consider the cultural features of some of these archaeological evidences where copper has been found with stone tools and hence referred to as **Chalcolithic** period.

2. The western border

Towards the north of Kandhar city and not very far from Lashkari Bazar in Afghanistan occurs the famous site of Mundigak which was excavated for 10 years from 1951. Mundigak does not exactly form the western border of India but it is important for two reasons:

1. It is a site which lies almost mid-way between the Iranian influence in the west and the Baluchi region in the east

2. Lashkari Bazar was Mahamud Ghazni's winter capital from where he controlled the passes from Kandhar to Indus valley in order to invade the country at his will. Mundigak and its influence in the same manner might have had a monopoly influence in the Indus region.

It is needless to emphasize that Mundigak is completely an independent development of Afghanistan but flourished long enough (approx. 4000 B.C. to 2000 B.C.) to show the spread of its influence farther east, at the same time being itself influenced from the west. Briefly speaking 4 distinct periods of occupation have been identified.

Period I: Radio-carbon date from nearly top of this period is estimated as 3945 B.C. This represents a semi-nomadic occupation and rudimentary evidences of dwelling which might have been constructed with pise are found in the initial phases of this period. The final phases show mud brick used for rectangular houses with compartments made inside. Five hearths or ovens are found within the rooms. Wheel-made painted ware found usually includes various kinds of bowls, cups and jars. Figurines of cattle and humans along with both alabaster and copper are found from this period. Some of the pottery has even polychrome paintings on them.

Period II: The radio-carbon date for this period is 3480 B.C. Although there is a denser occupation in this period, there are hardly any cultural innovations recorded. Infact the ceramics are distinctly cruder than the older period. Sling stones, stone arrow points, crude stone button seals and bones are the other objects recorded. The dwelling structures follow almost the same pattern.

Period III: The radio-carbon date for this period is 2995 B.C. The period is marked by very well painted wheel-made pots. Dwelling structures are still prepared by sun baked clay and there appears to be more emphasis on clusters of smaller rectangular rooms, each one of them maintaining a door which opens outside but without any inner connection between the rooms. Wells are dug between these room clusters. Bronze axes with hole and socket, bone and stone tools form the other cultural objects of this period. Big narrow-mouthed jars, funnel shaped bowls, deep bowls with flat or rimmed base besides the typical beaker shaped vessels form the usual types. The paintings executed are usually geometric with filled-in areas. But pipal leaf and birds are also recorded in some cases.

Period IV: A radio-carbon date of 2500 B.C. is ascribed to this period. For the first time the settlement shows a transformation towards fortified city features, although the bricks used are still sun dried. Massive defence walls,

square bastions, and temple complex form the main structures of this period. Pottery shows red slipped ware on which extensive decoration with black paint has been done. Various patterns of filled-in geometric designs form the usual motifs but birds, ibex, bull and pipal leaf are also executed. Terracotta female figurines and male head with hair tied behind are the other two important features of this period. Apparently many of the features of Mundigak-IV have their parallel in the sites lying further east in the Quetta valley. Mundigak offers a near complete archaeological evidence of a village evolving into an urban civilization with high degree of social complexity. But this would appear very simplistic unless we can keep our minds open to various cross-currents of influence that might have been working on this population at this time. Normally no Afghan village,with or without the knowledge of metal, can be expected to show such a rapid pace of growth as Mundigak seems to indicate. In the absence of concrete evidences of the processes that might have been active in the whole region during the period we always seem to be taking this 2000 years of occupation as long enough to show the rise of a statehood. It does not require much effort to search evidences from the contemporary village India to prove that rise of a state is not a natural eventuality for every farming society. Mundigak, therefore, has to be viewed within the canvas of the entire Irano-Afghan scenario.

The region between Baluchistan and the plains of Indus is marked by several groups of insular developments and each of these has, in some way, influenced the Indus Civilization. These influences are better marked in the Indus ceramics and hence have developed names which refer mainly to the ceramic features. We might attempt to identify these distinctive styles as follows:

Quetta Ware: This ware is best evidenced at the two sites of Kili Gul Mohammad and Damb Sadat. The ceramics are characterized by a distinct variety of decoration and shape. A cream and buff colour slip is used and, over this, bold black colour is used to execute the decoration. The decorations are mainly in the form of squares, waves and steps. The alternate areas in these lines are executed in colour so that the decoration stands out in bold relief. In the final stages varieties of floral motives are evolved. One of the most characteristic shapes is a beaker shaped ware with ring base and often with slightly concave vertical body.

Zhob Ware: This ware has been described from Periano Ghundai in the extreme north of Baluchistan and is also identified in Mundigak. These are usually red slipped wares which show more of animals, birds and human

figure decorations. Open-mouthed bowl with incised lines on the inner surface forms one of the characteristic types of this group. A terracotta female figurine-with goggled eyes and covered head-forms one of the cultural objects and has earned the name of Zhob **mother goddess.**

Amri-Nal Ware: These two ware groups belong to the same period, though with different origin. Amri culture essentially belongs to the plains while that of Nal to the hills. These two cultures have certain common elements. In both the kinds the fabric is fine and thin and has a cream-coloured slip. The painted designs are mostly geometric, though animal forms also appear in moderately high frequency. The animal forms usually depicted are fish, scorpions and humped bulls. The Amri ceramics are usually bichrome, that is, in red and black. While Amri lies almost on the main Indus valley,Nal is further west and is situated near the Baluch hills. Nal, therefore, shows more evidence of affinity with the sites of hilly Baluchistan. The decorations are in polychrome i.e., colours like black, brown, red, yellow and even blue and green are used.

Kulli ware: Like Amri-Nal Kulli also belongs to the southern limit of Baluchistan and Pakistan. 15 km south of Kulli a site called Nindowari has now been excavated which shows a Kulli ware occupation lying directly under a Harappan culture. This culture is usually identified with globular bottle shaped vessels and perforated jars. The fabric is usually buff-pinkish with a white or pale red slip. The decoration usually depicts naturalistic animals often with landscapes and trees etc. Animals drawn are usually shown humped. Besides these, geometrical designs in the form of series of lines, dots etc. are also commonly executed.

Kot Diji: The site lies north of Amri and is situated on the eastern bank of Indus almost within its middle reaches. It has a cream slip with red, sepia or black decoration. Dark or wavy bands with some animal motifs form the usual depictions. Curved horns with six petaled flowers between the horn tips or fish-scale designs take characteristic shapes. Mughal has chosen a large number of Kot Diji pottery types to demonstrate linkage of Early Harappans with this site.

Thus, we see that from Mundigak to Kot Diji there are numerous early farming communities settled at different nooks of valleys which developed their own characteristic features. The entire episode can be roughly taken to have stayed from 3100 to 2100 B.C., i.e. for approximately 1000 years. Almost all of these sites show ceramic similarity with the Iranian sites on the one hand and Harappans on the other. It will, therefore, be logical to assume

that origin of Harappa may have links with these hill cultures. This relation can be visualized as mere confederation of these 'tribes' as authors of separate cultures or a mere bringing together of the artisans of these cultures under a different and more powerful social organization. Archaeologically speaking all these cultures show certain common processes and features as follows:

1. A simple village life with mud-brick dwellings and microliths with crude pottery forms the emerging pattern.

2. Subsequent phases show little change to support external influence. In fact, many of these continue with microliths inspite of the appearance of metal. Ceramics show a distinct emphasis on very colourful decoration.

3. With time secular structures start appearing with distinct evidence of a large population maintained within the system. Multichrome artistic pottery is soon replaced with black-on-red bichrome styles. Mud brick structures still continue although often a rectangular room without any outlet has been found to evolve. Archaeologists believe that these were merely structures raised on which the actual dwelling was constructed with wood. The raising of the dwelling, therefore, appears as a necessity although we would perhaps never know why.

4. Some of these sites continue to survive even after the Harappans had consolidated their regime in the lower plains.

3. Indus Valley Civilization

Indus valley civilization is perhaps one of the most widely written topics in Prehistoric Archaeology. In this small attempt to provide essential features of various cultural phases in India we have to be, by necessity, extremely brief in our attempt to summarize this period.

Around 2300 B.C. to 2000 B.C. a large number of sites with spectacular similarity in their cultural features mushroom all along the Indus and its tributaries and spill over in the adjoining river valleys. The total spread of this culture is now estimated to be over an area of nearly 2 million square kilometers with the river Indus forming the vibrating heartland. The features which mainly characterize this spectacular culture are many. When all these occur together the site is referred to as urban metropolis. These features are listed below.

1. Indus seals with their specific motifs and scripts occurring in steatite, lime stone or alabaster. So far nearly 2000 such seals have been found. Copper

tablets containing the same script but slightly different depictions are also known from some sites.

2. A specific fabric, shape and decoration of pottery is almost identically repeated in all these sites

(a) A dark tan slip with well fired wheel-made fabric

(b) Goblets with pointed base, cylinderical jars with all round perforations, jars with extended S-profile and dishes on stand are among the most commonly repeated forms.

(c) In decoration the most common Indus type is a series of intersecting circles, pipal leaves, peacocks, humped bull and scorpions. These are executed with bold black colour bands between series of lines.

3. In addition to the above terracotta cakes, weights and measures, terracotta figurines, inlayed beads with tubular holes driven through them and large number of toys in terracotta form another series of common feature in this culture.

4. Finally, construction of a fortified township with underground drains,individual houses etc, usually separated from another raised structure (usually referred to as the **citadel**) where larger structures around a bath are constructed. All these constructions show the same measurement of burnt bricks of 7 : 14 : 28 cm (1 : 2 : 4) proportions and are bound together in the same pattern. The citadel as also the lower city was surrounded by defence walls. The plaster used was mainly mud mixed with brick dust and lime.

Most of the sites where the twin city dwelling pattern has been identified are referred to as urban metropolis. The main sites in this group are as follows:

1. Harappa on Ravi in Punjab, Pakistan.

2. Chanhu-daro on Indus in Nawabab Shah, Pakistan.

3. Mohenjo-daro on Indus in Larkana, Pakistan.

4. Lothal in Sabarmati delta, Gujarat, India.

5. Surkotada in Kutch, Gujarat, India.

6. Kalibangan in Ganganagar, Rajasthan, India.

7. Banawali in Hissar, Haryana, India.

So far more than 200 Harappan sites have been recorded but not more than a

dozen of them can be really identified as urban metropolis. (Some authors have counted as many as ninety urban centers). All these urban townships are situated near the bank of a stream or the delta of a river near the coast. Allahdino and Balakot in Pakistan and Lothal and Desalpur in Saurashtra are the examples of the coastal sites.

General character

The excavated areas reveal that the structures were built after a rectangular, or at times, parallelogram raised platform was constructed with mud-bricks, filling this to a height of 20' to 30'. This raised dominating and overlooking area is called the citadel. There are series of rooms built along the length of a rectangular lake, called the great bath, constructed along one side of the citadel. These rooms have separate and individual stairs leading to the bath. The backyard of these rooms joins with a huge structure which is believed to be the granary. Towards the southern side of the citadel occurs a huge hall-like structure without any post-holes for supporting the roof. Further south is the cemetry from where a large collection of skeletons has been made. A separate mound in the east shows the evidence of a line of small rooms apparently for labourers or soldiers and large pounding platforms with burnt wheat. Surrounding this complex of buildings, there is found the defence wall with two entrances. The river flows just below the granary from the north-west side of the excavated region. The living quarters or villages are found in another corner separated from the main citadel complex but within the defence wall. All these structures are erected with burnt bricks of same size and in the same pattern of binding all over and repeated identically in all metropolitan centres.

The residential area shows considerable variation in the size of dwelling. There are houses which are single roomed ones and there are others which have more than dozen rooms with passages, courtyard and bathrooms with individual boundary walls. Drains were covered and led to lanes outside which in turn were connected to soakage pits. Many of these houses are provided with stairways indicating an upper floor. Some of these rooms are as big as 20 ft X 23 ft in size. In many houses private wells have been dug with 3-4 ft circular mouths. A separate mound occurs in most of these sites where a line of small rooms, apparently for labourers or soldiers, is found.

Some of the most significant objects found in these sites are a large number of seals, beads, naturalistic statues, chess-boards, weights and measures, terracotta figurines, metal utensils and weapons, stone axes and chert blades. The weights seem to have 1 : 6 fragment system. The measuring rod shows

that the unit of length was 13.2 inches and perhaps the lowest fraction was 0.367 inches. Terracotta figurines include some toys, wheeled carts and some grottesque human forms which might be used as some form of folk-cult objects.

The Great Bath:

The pool measures about 39 ft by 23 ft and is approximately 8 ft deep. The stairs into the pool terminate on platforms which are a little over a foot from the bottom of the pool. This platform extends right across from one side to the other and is 3 ft in width. The pool is rendered water-proof by lining it with bitumen. There is also evidence that the steps were covered by wooden treads, slotted into the sides of the stairs and fixed with bitumen. There are channels to bring water to the bath from a well or a channel cut from the river depending on the site. Arrangements for periodic cleaning of the bath are evidenced from the man-holes made at some sites.

The Priest-King:

At Harappa a structure of 52 ft X 40 ft with almost 4 ft thick walls filled with mud brick forms a kind of public building. Here in one room was found a bearded head carved in limestone. It is 6.9 inches high. The rounded head and equally round face is extremely well carved and shows the upper lip shaven like many other representations known from Sumarian sites. The hair is bunched in a bun at the back. The beard is also cut in a round fashion to give the face an oval appearance. The ear is flat and formless. The eyes are slit like and designed for shell in-lay. Bound on the forehead is a band with a circular amulet on the forehead. The band is tied at the back with V-like strands hanging from the back. A similar band is tied on the right arm which along with the right shoulder is bare. The left shoulder is covered with a shawl which drapes over the back and passes under the right arm. The shawl is decorated with engraved trifoil designs and these are also designed for inlay. There are few more similar fragments of statues recorded from this site. One of these is a 16.5 inches high seated figure of a man with his hands resting on knees. The depiction of the eyes and the decorations of shawl, presence of the forehead bands etc. in this man compares with both priestly and king-like attributes and hence the name Priest-King.

Lothal Dock:

Of the many surprising features of the Indus valley towns the so called Dock found at Lothal is perhaps the most spectacular feature of an advanced civilization. This is a rectangular depression 219 X 37 meters and is enclosed

on all the three sides by fired brick walls. This is connected to the acropolis by a great platform of 240 m x 23 meters measurement which has been interpreted as "the wharf". There is also a spill way described in one of the walls which shows evidence of wooden *sluice* doors on grooves. Some authors have refuted this interpretation of the structure and have argued that this kind of structures are quite commonly known even today and are used as fresh water tanks in coastal regions which do not have any rivers in the neighbourhood.

Seals:

Harappa or the Indus valley civilization is almost synonymous with the characteristic seals that have been found almost invariably associated with the urban centers. The bulk of the seals are prepared on steatite carved intaglio. Most of these are square in shape with a perforated leoss at the back. A minority of these are cylindrical in shape or made on copper or even stone. A group of them shows such animals as water buffalo, humped bull, the Indian rhinoceros, elephant, tiger or gharial. There is another group of them which shows mythical animal forms or symbols like swastika, cross or loops. Finally, there are others which appear to be deity like figures sitting with animal horn as head dress. There are some showing a powerful man holding two hapless tigers by the throat. In one depiction a ram before the same horned figure is taken to indicate sacrifice. Almost all these depictions carry some inscriptions which are still awaiting an acceptable deciphering. One of the recent attempts of reading these scripts,which has gained fairly good acceptance, claims them to be a form of Proto-Dravidian script. It is believed that most of the writings are names of individuals.

Trade:

The occurrence of lapis lazuli, silver, gold, lead, and other precious stones and metals in the Harappan urban centers definitely indicates connection with places of origin of these noble materials, i.e., Iran, Afghanistan and the regions adjoining them. The occurrence of possible grain collection centers coupled with this positive evidence can be taken to indicate a possibility of trade. The uniform measures and scales can be finally taken to nail the above evidences of the existence of organized and advanced trade. Once trade is accepted Harappan urban growth and widespread influence become explainable. Authors speculate that both river and maritime routes as also land routes were used by these traders. This leads us almost to the threshold of accepting the existence of a bureaucracy in Harappan civilization. The argument of a proper statehood having emerged on the Indus basin during this civilization

rests mainly on the above set of logics.

Having gone through some of the spectacular features of this widespread civilization we might summarize the culture as follows:

1. The Indus valley people were drawn from some of the pre-Harappan cultures in the Punjab plains around 2300 B.C. These pre-Harappans had strong links with other cultural centers farther west. At Kalibangan a similar pre-Harappan population must have already spread around 2500 B.C. At Burzahom the Chalcolithic layers are not without similarity in individual material cultural objects with these pre-Harappan Aghan cultures. Why and how they organized themselves to colonize the fertile plains of Indus and Ghaggar would perhaps never be known but that they did organize into an enormous population and colonized the area into the world's oldest and largest civilization is an archaeological reality.

2. A spectacular success in agriculture must have provided the initial thrust which pushed them into an advanced form of administration. Grains as state levy were collected and stored in the granary under the direct supervision of the men who stayed in the quarters above the great bath. The indispensability of bath for these people and the added privacy of individual partitions provided in the bath led many authors to believe that these were meant for priests who used to take bath twice a day in the manner of Hindu brahmins and used to conduct their rituals in the partitioned compartments. These priests evidently were also the rulers as they housed themselves in direct proximity of the collected grains. It is believed that this grain was shipped for trading as there occur outlets for lowering loads directly from the granary into boats waiting below. The soldiers were perhaps employed both for defence as also for various kinds of labour. The city situated little farther (usually lying east of the citadel) must have housed battery of ministers and clerks to run the social system. It is possible that artisans like bead-makers, metal-smith, etc. were also alloted houses in this city. The halls - referred to as either schools or centres of community gathering--may have been used as state worshipping centers.

3. The town-planning and architectural excellence of these city structures seem to be quite incredible for that remote period of time in which they occur. Every room is floored and every house is equipped with a toilet and bath room. The streets, though not paved, are planned exactly at right angles to each other. A paved drain runs along the length of the streets. The chutes from individual quarters are linked to this drain. At small intervals these drains are connected to soakage pits. The houses were definitely raised to another floor

above ground and had in many cases their own well situated in them. These show features of a complete planning of all details before actual population moved in them. The defence walls are another example of this perfect planning. Evidences of reinforcement of the defence wall show a constant architectural vigil. At Surkotada another interesting feature recorded is the possibility of big wooden trunks erected at the corners of the streets--as if to prevent a fast moving cart from damaging the building corners while negotiating the bend.

4. The copper and bronze objects, although limited in their typological varieties, are uniformly found in almost all these far-flung cities. This is equally true of the seals, the beads and terracotta objects. The uniformity of technique, casting and motif repeatition leaves no doubt that a proper professional group must have been maintained within the society. Likewise redistribution of produce (both agricultural and manufactured goods) must have been quite efficiently maintained in order to give rise to this remarkable homogeneity over such a vast region. Art objects on terracotta, stone and in some instances on metals throw some ventilation to the nature of the society that could attain such hights of organized urban centers. Precious metals and stones on the one hand and chert blades (ribbon blades) on the other seem to indicate a stratified system. This is further substantiated by varying size of living quarters, partially excarnated bones stored in big jars outside the house for some and burials for others and facilities within the living quarters. Since an exact picture of the burdens and privileges of the inhabitants of these houses will perhaps never be known to us, the nature of the statehood for us will remain merely as a possible hypothesis. Labour organization to cut wood and distribute to the potters or brick kiln workers, to man transport for internal distribution and dozens of other specific functions cannot be visualized without the possibility of a bureaucracy. Thus, a statehood of some kind can be visualized. Alternately one can visualize a complex tribal structure based entirely on kinship alliance of a federal nature (chiefdom). This alternate would seem more congruous with the situation of all the Afghan-Baluchi sites spread in the west. Further, this can also take care of the incongruity of a statehood rising suddenly at one place and not in the neighbourhood.

Finally, we must add that both cotton seeds (and hence textiles) and horses were initially claimed to have been domesticated by the Indus valley people. Recently cotton has been decidedly proved as existing (from Mehergarn) in this region but existence of horse has yet to be confirmed by specialists. Thousands of bones from Surkotada claimed as horses might as well be wild asses still found in this region.

4. Post Harappan Spread:

Around 1900 B.C. one can see a distinct change in the Harappan characteristics at the Harappan metropolitan sites. At Chanhu-daro, Jhukar and Amri one can observe this shift quite clearly. A new pottery style emerges and the township shows a degeneration when compared with the architectural excellence of the earlier period. The new type of pottery with buff colour and red to cream slip is often referred to as the **Jhukar group**. The pottery is ill fired, coarse and painted mainly with geometric motifs in black or purple. This is further followed by another group which is referred to as the **Jhangar** group who take to an entirely grey or black pottery. Similarly at the citadel mound in Harappa the change is noted in the form of a new element which is referred to as **Cementry-H** pottery. Besides the pottery there is a new feature of urn burials recorded in this phase and this led to the belief of an exogenous intrusion. The ceramics are a red ware elaborately painted with black paints. Motifs like peacocks, bulls and pipal leaves occur although in quite different combination, e.g. leaves sprouting from horns or humps of bulls, tiny human figure lying supine in the stomach of peacocks etc. In the forms which are new one can see the footed vessels with narrowed and cylindrical necks, coconut shaped ringed jars with lids and carinated jars.

The situation in east Punjab and Haryana is no less interesting. Here bordering Rajasthan (in Haryana) occur several sites, which have mainly a rural character and only influence of Harappan ceramics, between 1900 to 1200 B.C. These have been given such names as Siswal A, B, C, & D or Mitathal depending on the region one is dealing with. There are some mud-brick structures also found in some of the sites but these do not compare with either Kalibangan (Rajasthan) or Banawali (Haryana)--both being Harappan metropolis sites.

Siswal A: It is a red ware with geometric decoration of black paint. Angular-walled bowls, globular jars, small dish-on-stand, and some S-shaped jars are the usual types attributed to this period. Generally this falls in the Pre-Harappan category in the Kalibangan scale.

Siswal B: Most of the Mature Harappan types are repeated including both shape and decoration.

Siswal C: Mostly all Mature Harappan types disappear. The distinctive types are carinated bowls, dish-on-stand, and jars with high collared rims. The decorations are mainly geometric and at instances seem to be carelessly executed. There are some similarities of this pottery group with cementry-H

type pottery as well

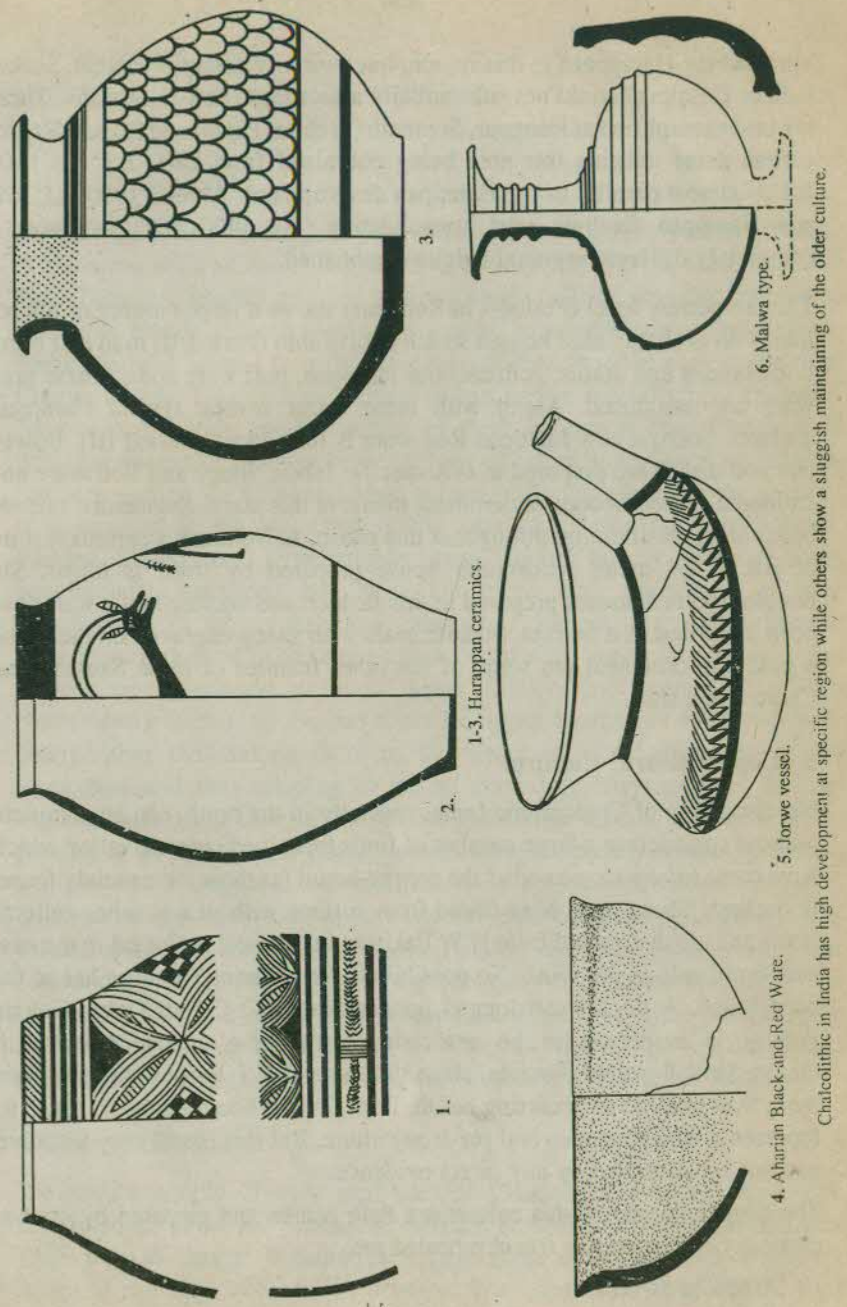
Siswal D: It is marked by the emergence of Painted Grey wares with other Siswal forms.

It is interesting to note that in these sites the Harappan element does not show as sudden a disappearance as is noted in the various metropolis. Looking at the few carbon dates available one can easily surmise that the change was more sudden in the urban centers than in the rural hinterlands which had some kind of contact with the former. This is typical of a situation where the political nerve is centred within the city. At this juncture we might briefly enumerate various reasons of the end of Harappan civilization as claimed by various experts on the subject.

One group of scholars argued that the Indus was suddenly choked by a mud extrusion caused by tectonic movement. Silting of the river caused havoc with agriculture and hence the economy. Another group of scholars felt that Aryans invaded these regions and plundered them to establish their own kind of culture.

Yet there is a third group who feels that the Harappan civilization itself was a product of Aryan culture who in the face of increasing aridity in the Indus plain slowly migrated to the Gangetic basin.

It is very important at this stage to mention that from the archaeological record one has no methodological possibility of reconstructing what language was spoken. Further, it is difficult to demonstrate that fire was not worshipped by any Chalcolithic culture. So it is better to abandon this much maligned word (Aryan) once for all from the books of archaeology. Climatic shift argument recently offered from the Ghaggar source seems, at the present state of our knowledge, as most convincing. It proposes that Ghaggar had the possibility of releasing huge amount of water into the Indus when most of the upper tributaries feeding Ghaggar were active. Either a techtonic movement in these unstable hills or a gradual climatic shift rendered Ghaggar dry and shifted the feeder tributaries to Chautang and finally to the Yamuna. Indus was naturally reduced in both strength and extent. This must have caused a decline in the economy and hence fall of the cities. It will not, therefore, be surprising if in the rural epi-region such changes are hardly noticeable. The Saurashtra region, unlike most of East Punjab and Haryana, demonstrates a fairly good concentration of an indegenous population before, during and after the Harappans in a vertical development without break. Rice, millets, sandle-wood and favourable cotton varieties of the region might have



Chalcolithic in India has high development at specific region while others show a sluggish maintaining of the older culture.

attracted the Harappans to this region, but their city collapse (Lothal, Surkotada or Desalpur) could not substantially affect these non-Harappans. These are best exemplified at Rangpur, Somnath (Prabhas Patan) and Rojadi. Radiocarbon dates indicate this area being colonized from 2400 B.C. to 1400 B.C.-- almost parallel to the Harappan development. Around 1900 B.C. the post-Harappan features start consolidating. By 1400 B.C. we have a completely different regional culture established.

The pre-pottery level (Period-I in Rangpur) shows a large number of microliths with probably mud houses which evolve into (Period-II) mud and burnt brick houses and drains. A micaceous red ware, buff ware and a coarse grey ware are introduced. Along with these occur several typical Harappan artifacts. Soon, a new Lustrous Red ware is introduced (Period III). Bowls, jars and dishes are prepared in this specific fabric. Black and Red ware and carinated vessels become a dominant theme at this stage. Segmented faience beads are quite common throughout this phase. At Somnath a curious feature of 3.8 X 2.4 meter rectangular house prepared by stone is found. Six double- roomed houses prepared in this fashion and enclosed by a wall have been identified as a market. Steatite seals with sheep engraved on them and a gold cup ornament are some of the other features of these Saurashtrian Chalcolithic sites.

5. 'Copper hoard' Culture:

No discussion of Chalcolithic India, specially in the north, can be complete without considering a large number of finds from the Gangetic valley which have come to be nick-named as the copper-hoard (as these were mainly found in caches). These have been found from surface without any other cultural items and are distributed from N W Pakistan in the west to Bengal in the east and Tamilnadu in the south. No possibility of any dating for these has so far been found. A thick water-logged pottery termed O C P or Ochre Colour Pottery is suspected to be associated with these copper objects on circumstantial ground. Further, since the same O C P type is claimed from more than one site as occurring before Iron, Copper hoard culture is taken to represent a late Harappan and pre-Iron culture. But this is still very tentative and not substantiated by any direct evidence.

The copper objects of this culture are both beaten and prepared by double casting. Objects usually found repeated are:

(i) Antennae swords

(ii) Harpoons

(iii) Single and double axes

(iv) Celts

(v) Swords and

(vi) Anthropomorphs

In western UP Bisauli, Rajpur Parsu, Mathura, Etawa and Saharapur are some of the areas where Copper hoards have been recorded from more than one spot. These are usually grouped within a single cultural area and referred to as Copper hoards of Doab region. As opposed to these Khunti, Hami Saguna, Mahisadal and Sonpur from W Bengal and Bihar form the eastern group of Copper hoards. Likewise the central Indian region specially near Jabalpur-Nagpur strip yields another outlier of these copper objects. Gungeria in Balaghat district of Madhya Pradesh is one of the richest of such sites. In the southern section the Copper hoards are generally distributed in the areas of concentration of the Neo-Chalcolithic sites like Brahmagiri, Tekkalkota, Piklihal, Hallur, etc. Typologically these Copper hoards do show some geographical variations but these are more with regards to relative frequencies of the types than otherwise. Except for the enigmatic anthropomorph most of the types are recorded with same marginal variation from either Harappan or west Asian Chalcolithic centres. This can conveniently lead us to assume some Harappan antecedant for the Copper hoard rather than taking them as the weapons of the destroyer of the Harappans and thus alluding to the all pervading 'Aryan bogie' for our explanation. At this state of our present knowledge it could also be a strong possibility that the Copper hoard cultures were completely contemporaneous with the late Harappans and were politically governed from the Harappan urban centres. A radio-carbon date from an excavated site belonging to this culture alone can solve our problem. Finally, one must admit that in our consideration of Chalcolithic India the Gangetic valley represents perhaps the only region which is still not fully understood. From the middle Ganga region (North Bihar) to lateritic W Bengal we enter into what can be best designated as Black-and-Red ware zone with a very late Neo-Chalcolithic feature.

6. Chalcolithic East

We have a couple of excavated sites of Chalcolithic evidence from this eastern zone. These are Chirand from Bihar and Mahisadal and Pandu Rajar Dhibi from W Bengal. Broadly speaking all these show a duration of only six to seven centuries before Iron appears. They start around 1500 B.C. and continue upto 800 B.C. There are no such evidences of elaborate habitational

structures as are known from so many of the western Chalcolithic sites. The pottery, however, shows an advanced technology of preparation and finish but in shapes finished varieties are not many. At Chirand, for instance, one encounters a large number of lustrous wares with burnishing on the exterior in addition to the grey, black, red and black-and red wares. Spouted vessels, bowls, footed vessels and channel spouted bowls are the usual table wares known. Designs of decoration are mainly criss-cross lines and concentric circles painted in both black and red ochre. Initially there might have been pit-dwellings but the Chalcolithic level shows circular huts of 4 meter diameter with paved floors. Wheat, rice, and lentils are found among the cereals cultivated. Very soon these give rise to another period with narrow necked goblets associated with iron. What would appear as extremely significant is that from pre-metal to iron the generalized cultural features hardly show any change inspite of the arrival of metals of efficiency. Pandu Rajar Dhibi in Bardhawan district is situated along the Ajay river. There are four periods identified of which the first two are counted as Chalcolithic and the rest are associated with iron. The huts are both round and rectangular and may have had red plastered walls. The floor is paved with lateritic mud and cow dung. And yet the only radio-carbon date for this is as young as 1100 B.C. The pottery is both painted red ware as also black-and-red ware. Storage jars, dishes-on-stand, channel spouted vessels and high necked jars are some of the common ceramic forms. Decoration is limited to only geometric forms. Crude stone blades, ground stone axes and a number of copper objects including fish hooks besides bangles are the other objects known from the pre-iron levels of the site.

At Mahisadal in the district Birbhum adjoining to Burdhawan the Chalcolithic levels are dated to almost 1350 B.C. but otherwise the cultural features are more or less comparable to Pandu Rajar Dhibi.

It would appear from the above that copper enters essentially within a stone-bone base in this region. Although in ceramic features they show considerable perfection these did not affect the total cultural status of these inhabitants. In fact the same features continue to occur even after iron emerges on the scene.

Ahar

South-east Rajasthan is an area which could be visualized as a region which joins Saurashtra in the south and the Malwa region in the south-east with the southern fringes of the Thar in the west. In many regards it develops its own climatic individuality because of the rivers Gambhiri in the north and Berach

in the south. These year round active rivers and their tributaries form almost the life-line of the region. We have evidences of huge Palaeolithic populations in the region but surprisingly in the subsequent period the Thar region was less attractive to the early settlers. The first human colonization of the region after the Palaeolithic period is witnessed along the river Banas during Chalcolithic period. Several sites of this period have been recorded along this and the Berach basin. Ahar, Gilund and Kayatha, among these are excavated. Of these the first two are from Rajasthan while the third one lies towards the east in Malwa region. Finally it will be of interest to remember that Ahar is the closest to the Harappans both in geographical promixity as also in radio-carbon dates, if we do not consider the Haryana and East Punjab sites.

The excavation at Ahar has yielded a thirteen meter deep habitation debri spread over almost 500 meters by 270 meters. This will surely be indicative of a large enough population settled for a long enough period in this region. There are also direct evidences of an enormous amount of slag besides crucibles and furnaces found within the area. Further, unlike most of the Chalcolithic sites in the Gangetic valley Ahar does not have any deposit with iron content. There is no doubt, therefore, that here we are dealing with an active copper smelting activity and a colony developed in connection with this activity. Perhaps that can explain why Gilund lying only 80 km away shows some significant points of difference with Ahar.

At Ahar the houses are oblong and the walls are made of stone and mud-brick. These have, at times, been decorated with quartz. The roof must have been thatched and flat with wooden rafters used. Normally the houses carry no compartment, nor any courtyard and measure 7 X 5 meters or 3 X 3 meters. In an extreme case a house measuring 10 X 5 meters has also been recorded. Although no grains have been found it is believed that both bajra (millet) and rice may have been cultivated by these people. The oldest period at Ahar is believed to extend to 2300 B.C. and hence falls well within the Harappan range. The cultural material yields multiple hearths, quartzite saddle and querns but no ring stone, bolas or celts. Curiously chert blades which are otherwise quite common in the Chalcolithic sites in the adjoining region, are conspicuously absent at this site. For a habitational debri of 13 meter thickness, finished copper implements are also not very many in number. In all 5 axes, one knife blade, one sheet, a bangle and 2 rings of copper are all that has been found. The copper technology also appears to be much poorer than what has been observed in the adjoining regions. The richest collection for the site is the ceramics and the terracotta objects.

The Ahar ceramics yield at least seven main wares of which 2 types that dominate are:

(i) Black-and-Red wares with white paint used for decoration and *(ii)* Cream slipped wares with black paint used for decoration. Some of these show surface roughening on the lower part, while others show applique boss designs covering the entire exterior. Decoration is mainly linear and dots or series of comas. One of the most consistent shapes is dish-on-stand. Vase with corrugated shoulder and long neck, lotas and varieties of bowls besides crudely finished storage jars form the other types. Terracotta figures mainly yield several humped cattle, bangles, stoppers, spindels and lids.

The other two sites of the Banasian complex are perfectly comparable to Ahar except for the fact of yielding several chert blades but still no celts, bolas or ring stones. It would appear that the Banasian complex has developed completely within a village infrastructure without even indication of a proper farming activity. Most of the ceramics being table-ware appear least congruous within the mud houses. Cutting of fire wood for smelting copper required axes and Ahar shows only some crude axes. In fact Kayatha lying further east has a much larger number of bangles and rings than Ahar itself. Knowing the chronological status of Ahar, it becomes a strong possibility to consider the Banas group as merely miners' camp under the suzerainty of the Harappans at Lothal. Gilund and Kayatha in this regard would appear to be relatively individualized and influenced by the Malwa regional features.

Malwa

Western districts of Madhya Pradesh are traditionally referred to as the Malwa region. That is, from district Gwalior in the north to Nimar in the south forms its western border while in the east Raisen to Chattarpur forms the eastern border. Of these districts those lying northerly are very arid and dry and are mainly drained by numerous tributaries of Chambal and Betwa. The southern districts are very fertile primarily because of the Deccan lava forming its mantle. This lava produces extremely rich black soil which must have attracted agriculturists from the time of prehistory to history. A large amount of human colonization occurred along all these rivers from around 2000 B.C. and continued until 1100 B.C. when iron arrived. These sites and their cultural features are so homogenous that in literature they started getting referred to as the Malwa culture. Further south along the upper reaches of Godavari almost identical ceramic content is recorded in slightly changed context and these are also referred to as having Malwa ware.

In Madhya Pradesh some of the well excavated Malwa sites are Eran, Nagda and Navdatoli. In northern Maharashtra the Malwan sites are Chandoli, Nevasa, Inamgaon and Diamabad. Around 1300 B.C. The north Maharashtrian sites developed some different traits before finally showing iron around 1000 B.C. This group is called Jorwe ware. Navdatoli in its earliest phase yields a rich stone blade industry with copper objects. Domesticated wheat as also cattle, sheep, goat and pig are the usual floral and faunal remains. The pottery shows a good many hand made specimens with the Banasian forms of Black-and-Red painted ware.

A red-slipped ware with decoration executed in black paint forms the other important ceramic group. The latter form develops into what is identified as Malwa ceramics when it standardizes its shapes and decorations in the next phase. Both circular and rectangular huts of wattle and daub are described from all the phases of Navdatoli, Phase-II is marked by the total disappearance of the Banasian Black-and-Red ware and also the introduction of rice in the region (1600 B.C. approx.) Goblets with solid pedestals become quite common. It is in the next two phases that a complete individualization takes place. Lota shaped jars, goblets on stand, channel spouted bowls and storage jars are given a very shinning red slip and then extensively decorated with variety of motifs. These include naturalistic, geometric and zoomorphic forms. Stylized representation of as many as 12 animals excluding the characterstic human forms with curly flowing hair have been recorded. It will not be an exaggeration to rate the Malwa ceramics as much richer than the Harappans if one were to consider the richness of their decorations. Metal objects known include copper antennae sword, knife, flat axe and fish hooks. Stone objects include an overwhelming number of chalcedony blades (with few retouched types of lunates, trapezes and knives), celts, ring stones, saddle and quern and bolas. Several terracotta figurines of bulls or only horns of bulls form another group of finds. In one of the Malwa sites (Eran in dist Sagar) on the river Bina a defence wall prepared by mud brick has been attributed to the Malwa phase. Some authors saw some internal stratification indicative in the Malwa society because of the existence of two distinct varieties of dwelling structures. The rectangular houses were 10 X 6 m in measurement while the round ones had only 2.75 m diameter. It will be more logical to imagine these round structures as non-dwelling storage places, as other cultural features do not show enough evidences of this kind of stratification.

Jorwe:

It is a culture which earned its name mainly from its ceramic speciality. It is

found spread all over Maharashtra and may have evolved slightly later than the Malwa in Madhya Pradesh (1300 B.C.-1400 B.C.). Inamgaon in Maharashtra provides us with maximum amount of cultural indicators for this period. It is a culture which had adapted to dried inland regions and heavily depended on irrigation, the evidences of which have been found. Wheat, barley and rice may have been cultivated in the initial stages but later stages adapted mainly to millets. Initially rectangular huts were used but eventually in the later phases these were all round in structure. At this stage the Jorwe of Maharashtra start showing numerous similarities with the Deccan Chalcolithic features.

The famous Jorwe ware is red or orange surfaced either matt surfaced or barnished with geometric designs executed in black. Carinated vessels with spouts fixed at various angles form one of the characteristic types. Carinated bowls and lotas are the other forms. Beads of agate, carnelian, gold, copper and even ivory have been recorded. Copper objects include axes, fish hooks and bangles.

It is argued that increasing aridity forced many of the early Jorwe settlements to either migrate to the Malwa region or adapt by changing their food habits around 1300 B.C. Thus, many Malwa regions show their final phases heavily influenced by Jorwe ceramics. Some of them might have migrated to the Deccan region. Thus, we see a chain of connections, in at least archaeological terms, demonstrated over the whole length of India during Chalcolithic period. That is, while Banas remained influenced from Harappa, it also got influenced from Malwa. Malwa in turn shows Jorwe connection and Jorwe shows connection with the Deccan Neo-Chalcolithic settlements.

7. Southern Chalcolithic Group:

Crossing Narmada one enters into the rugged plains of south India. Barring the coastal strips the inland regions are extremely rocky and dry. The main two rivers that drain the region are Godavari and Krishna (as one moves from north to south) with their numerous tributaries. These tributaries originate in the western Ghats which extend fairly deep across the breadth of the Peninsula (almost two third of the breadth along Pune-Hyderabad axis i.e. 18°N). Most of the prehistoric occupations during Neolithic to Chalcolithic occur in these montaneous area. The tributaries of Godavari show Chalcolithic colonization between 2000 B.C.-1100 B.C. which we have just got introduced to. Let us for our convenience refer to them as the Malwa-Jorwe group. The tributaries of Krishna, however, maintained altogether a different tradition. If the

available radio-carbon dates are to be relied, these were occupied from as early as 2400 B.C. and continued to survive without any significant change till iron arrived. Many authors, as such, like to consider them with the development of Neolithic cultural phase. More than one hundred such sites have been reported so far and these are spread over Karnataka, Andhra and Tamil Nadu. Some of the most important of these occurrences are:

(i) Kodekal, Utnur, Nagarjunakonda and Palavoy in Andhra

(ii) Tekkalkota, Maski, Terdal, T Narsipur, Sangankallu, Kupgal, Hallur, Brahmagiri and Hemmige in Karnataka, and

(iii) Gaurimedu, Mangalam and Piyampalli in Tamil Nadu.

Barring slight regional differences most of these sites are uniformly identical in both their features as also their succession pattern. That is, these are essentially hill dwellers with peripheral cultivation, hunting and cattel keeping. In almost all cases burials occur under living floor and hence these dwelling places might have been frequently abandoned and newer sites occupied. This might also explain the striking similarity between a large number of these sites. For the purpose of summarizing one can divide the succession of culture in these sites as follows:

1. A pure autochthonus Neolithic with poor pottery.

2. Without any change in other details, pottery shows improvement and with occasional metal intrusion (visualized as Jorwe contact period).

3. Again no basic change in the total culture but copper and bronze objects become common. Black-and-Red ware and horse bones start occurring (The latter two attributes are typical of the Megalithic period that follows). Terracotta figurines, faience beads and other precious stones are also found in many instances from this period.

We have briefly dealt with the evidences of the first period. The other two periods can be broadly taken as co-eval with the Maharashtra Chalcolithic period. What is most surprising is that a transition to a level of the knowledge of metal had very little impact on either cultural efficiency or cultural change. In the absence of any other data one can explain the situation as caused by a lack of an adequate demographic strength to launch into a labour intensive agriculture. The seeds domesticated by them also show a different level of farming. Millet, horse gram, bajra and legumes besides date plam and acacia species seem to have been their main food. For a community of mainly hunters and cattle keepers a shift to intensive farming requires a much

complex super-structure and kinship organization. Developing symbiotic relationship with already settled communities lying between northern Maharashtra to Malwa would instead be an easier course. Thus, metals obtained in exchange were put to-at the most-tree felling, bush clearing and fishing but seldom to hunting. In ceramics decoration is virtually gone except a line along the border or radiating triangles. The fabric is thick and gritty and in the younger phases wheel thrown. Shallow dishes, lipped, spouted or channel spouted vessels, handled and hollow footed bowls, jars, dish-on-stand and perforated pots are the usual types known from all the phases. Beads of gold, copper terracotta, agate and carnelian are also found in some sites. The stone implements include a large number of extremely slender and long microlithic blades which are in a minority of cases retouched into types. Some axes, adzes, wedges, bolas and saddle and quern are quite common. Metal objects include axes (very flat) and fish hooks. The rocky habitat provided the base of their dwelling with mud plastering on the floor. These are round houses of only 2-3 meter diameter, with few cases of post-hole evidences. At Sangankallu a hut of 5 m diameter has been found with as many as 13 post-holes. Hearths and storage jars are quite commonly found in these huts. Terracota figurines of bulls, horns and male human forms are known from some sites, while in others the rocks and boulders around the huts have art executions with bruisings. These represent cattle, long-horned humped bulls, and deers. There are some riding or hunting human figures as well as some wheeled carts. At Tekkalkota a flat Terracotta lid carries almost similar pattern of art execution with pin like punches done when the clay was leather hard. This shows a scene of a bull, cobra and two antelopes. In addition an important terracotta object identified as head-rest forms a significant find from some of these sites. Finally, it must be mentioned that some of the peripherally lying sites among them specially Utnur, Kupgal, Kodekal and Palavoy have yielded huge deposits of cow dung ash. At Utnur even the hoof imprint has been found within this once wet cow dung heap. All these evidences taken together leave very little doubt about a considerable livestock maintenance as part of these Neo-Chalcolithic groups. It is argued by some that these cow dung heaps were deliberately set aflame as a part of some festivity which marked the completion of a seasonal cycle of migration. That is, shortly after harvesting the population would move out with their animals to graze them. They would return to the site, burn the cow dung heaps and start settling for a short period of cultivation of their sturdy crops. At the present state of our knowledge this would merely appear as one of the possibilities only.

CHAPTER XI

Iron Age

1. General considerations

Iron age in India brings one to the threshold of ancient history. This is, therefore, a period for which some of the historical accounts of ancient history may be extended. It is no wonder that as a consequence of this large number of Vedic, Upanishadic and Brahmanic literary evidences have- from time to time-being recalled to understand the cultural process then existing in India. To some, mixing of archaeological evidences with such literary accounts have become a standard method of dealing Iron age in India. It needs no overemphasizing here that such an approach is essentially not conservative. To avoid this kind of an unholy amalgamation of methodology we might as well concentrate on the archaeology of Iron age in India. While doing so one cannot help but note that origin of iron in our sub-continent still remains a matter of dispute among specialists. It is important also to remember that like in Africa India has primitive tribes (Agarias of MP) who prepare iron with indigenous techniques and trade their finished wares. It will not be entirely illogical to assume that these communities must have had their knowledge from a time which might be preceding a formal Iron age by several thousand years. Formal Iron age sets in when this metal is harnessed to clear forests for establishing permanent colonies.

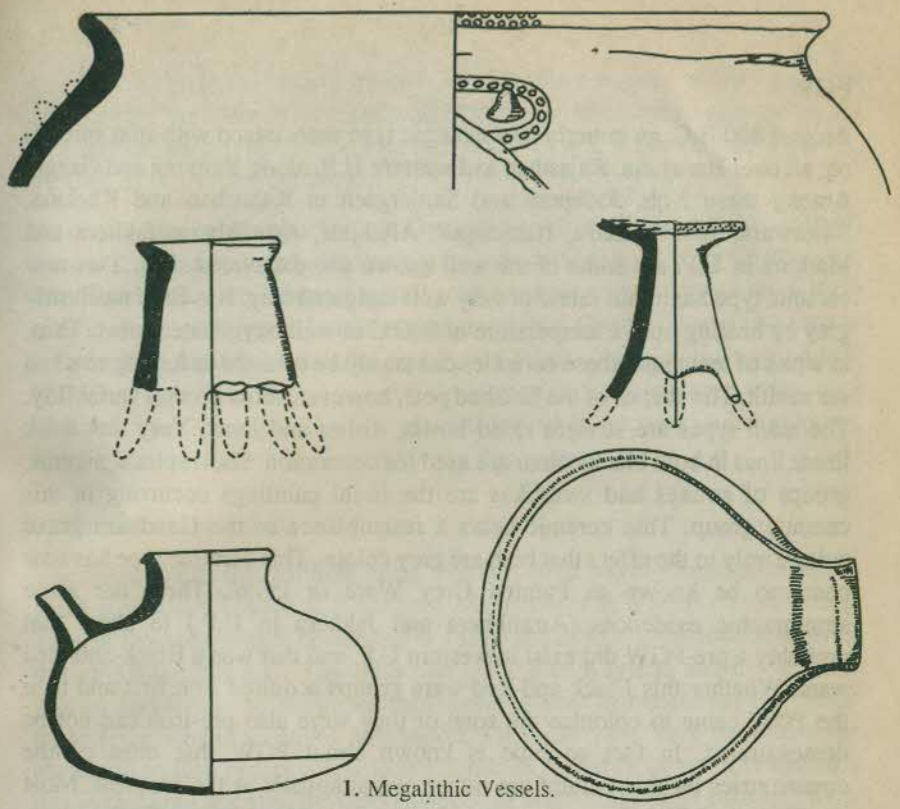
These might have eventually led to the establishment of large cities on the basis of a sizeable surplus and a super structure drawing upon this for its political power. Iron enters at different parts of India within different social contexts and hence the manifest resultant develops entirely different Iron age features in different areas. We might briefly examine these differntiating phenomena.

2. Gangetic Region

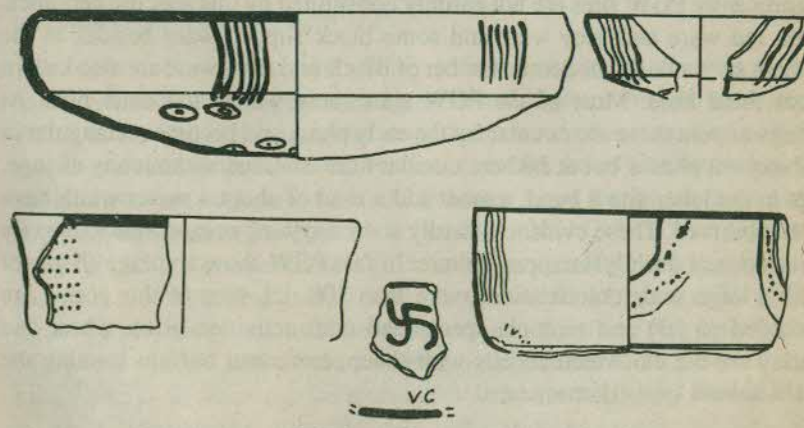
The colonization of Ganga basin by Iron users can be taken as one of the best evidences of second urbanization of India. Urban centers which mushroomed around Indus, Ghaggar and its tributaries during 2600 B.C. to 1500 B.C. were generally deserted after this. One would have normally expected a flush of population movement into the Ganga-Jamuna valley and indeed there is

evidence of a rise in the number of the Siswal group of sites in Haryana and East Punjab. Significantly an urban development in the entire Gangetic basin does not emerge until late iron users settle their city states mostly in the western flanks (west of Allahabad) of the Ganga-Jamuna region. Thus, one has to admit that the Gangetic region was not at all an area of attraction for most of the metal users in prehistory. In comparison Saurashtra, northern Maharashtra or even Rajasthan seem to have been much more preferred.

Understanding of the colonization of this region needs a consideration of the changes that can be witnessed further west. In Baluchistan the earliest development of settled economy and also perhaps the earliest evidence of copper (at least 2000 years earlier than Harappa) has been noted at Mehergarh. The occupation was abandoned before the development of mature Harappa but around the same region one can witness the transition of the post Harappan phase at Pirak. Initially Harappan influence can be demonstrated in this occupation center but very soon and perhaps around 1370-1340 B.C. first pieces of iron appear. The cultural continuity from the pre-iron layers is so remarkable that an invasion by iron users as a possibility also cannot be entertained. The houses are again (like the pre-Harappan stage) prepared of mud bricks. The pottery is coarse with applique bands and finger tip impressions. Terracotta figurines become much larger in frequency than the preceding period and they include horse, camel, humans- singly as also in the form of riders. The most important feature of this phase is the first time appearance of barley and rice cultivation in this zone. Terracotta seals of the size of large coat buttons are also known but these do not show any comparison with the Harappans. Evidence of a full fledged adoption of iron, however, is not demonstrable until about another 2 to 3 centuries. That is, Iron age west of the Indus can be broadly ascribed to the time bracket of 1100-900 B.C. In the north-west another development, in all probability in an independent manner, is demonstrated from what is now generally known as the Gandhara sites. These are usually large complexes of graves and are entirely known and defined from the accompanying grave goods. Taxila, Charsada and Timargarha are some of the important sites from this complex. The pottery is a red burnished ware and shows some similarity with the later Mundigak ceramics. City structures in this region are not identifiable till about 500 B.C. Thus, like Pirak in south west, Gandharas receive this metal without any change in their pre-existing culture. Furthermore these pre-existing cultures are completely individual in character and bear hardly any resemblance with the widely distributed Harappan features.



1. Megalithic Vessels.



2. Painted Grey Ware.

Iron age finally establishes beyond doubt that South and North India are basically separated at their cultural history.

PGW

Around 800 B.C. an entirely new ceramic type associataed with iron spreads out all over Harayana, Rajasthan and western U.P. along Yamuna and Ganga. Among these Noh, Jodhpura and Sardargarh in Rajasthan and Khalana, Bateswara, Ahichchatara, Hastinapur, Allahpur, Atrajikhera, Jakhera and Mathura in U.P. are some of the well known and excavated sites. This new ceramic type has a thin fabric of very well legigated clay. It is fired uniformly grey by heating upto a temperature of 800°C in well oxygenated kilns. Thus, in terms of technique these ceramics can surely be counted as having reached the zenith. The shapes of the finished pots, however, show no rich variability. The main types are straight sided bowls, dishes and lotas. Very few thick linear lines in bold black colour are used for decoration. Short spirals, sigmas, groups of strokes and swastikas are the usual paintings occurring in this ceramic group. This ceramic bears a resemblance to the Gandhara grave culture only to the effect that both are grey colour. This ceramic type has now come to be known as Painted Grey Ware or PGW. There are some stratigraphic evidences (Atrajikhera and Jakhera in U.P.) to show that probably a pre-PGW did exist in western U.P. and this was a Black-and-Red ware. Whether this Black-and-Red ware groups acquired iron first and then the PGW came to colonize the zone or they were also pre-iron can not be demonstrated. In fact so little is known about PGW that most of the commentries on this culture are rather oversimplistic at the moment. Most significantly PGW sites are not entirely constituted by this specific ceramics. Both red ware and grey ware and some black slipped ware besides in the eastern sites a fairly moderate number of Black-and -Red ware are also known from these sites. Most of the PGW sites show wattle and daub huts. At Bhagwanpura these are circular for the early phase and become rectangular in subsequent phases but at Jakhera circular huts continue without any change. Yet in the latter site a bund, a moat and a road of about 4 meter width have been observed. These evidences hardly show anything comparable to the city development during Harappan culture. In fact PGW show a village character with a large scale colonization (more than 300 rich sites of this period are recorded so far) and multiple specialized craft activities. Rice, wheat and barley are the cultivated cereals with sheep, cattle and buffalo forming the main animal types domesticated.

Bone objects and beads of PGW sites show a fairly high frequency. In rare instances glass as also lapislazuli beads are also known. Bones or ivory has been used to form a variety of arrow heads, bangles, needles,combs and hair pins. Some animal forms like bull, birds and ram are represented in terracotta

but human forms are totally absent. Remarkable evidence of iron smelting and forging has come to light from Jodhpura. Iron implements also are varied and include such types as spear heads, arrow heads, socketed tangs, blades, sickles, axes, knives and tangs.

As one moves eastward in middle Ganga valley from Kausambi (Allahabad) onwards, iron gets merely grafted within the previously existing Chalcolithic Black-and Red ware. Chronologically the point of emergence of iron in these sites is not very different from the western region. Generally speaking iron at Kausambi, Chirand, Mahisadal and Pandu Rajar Dhibi occurs around 800 B.C. But almost all these sites show the microlithic component continuing without much change. Sharply carinated vessels become quite common although most of them do not carry any decoration.

3. The Southern zone

Consideration of the southern zone would require paying some attention to south Rajasthan, Malwa and northern Maharashtra as a prior consideration. This is the area which developed a fairly consolidated regional character during 1500-1300 B.C. The Banasian leading to Kayatha and the latter to Malwa and finally to Maharashtrain Jorwe almost demonstrated the movement from wheat to millet adaptation. Of these sites very few show an attraction to iron except a few items obtained probably by trade. Thus, iron age in this area does not develop any special personality of its own like what has been observed in Western U.P.

The southern Neo-Chalcolithic sites which had shown so reluctant changes during their early metal period bring about a change for the first time around 800 B.C. At Hallur this transition may have occurred a couple of centuries earlier while in some other regions few centuries later. Considering a mid-value, therefore, appearance of iron in South India can be taken as almost co-eval with the same in western U.P., i.e. 800-500 B.C. The iron age in South India till today is known entirely from a large and complex variety of burials and their accompanying grave goods like the Gandhara Grave culture. Since these graves have elaborate stone arrangements around them these have traditionally been nicknamed as **Megalithic culture**. A point of great inconsistency in adopting this term needs to be specially kept in mind. This is, while 'Megalithic culture of South India' means iron age; the same term is the established designation used for a particular variety of sea faring Neolithic culture in Europe. Further, the "Megaliths of India" may not refer to any prehistoric culture but the memorial stones erected by the tribals in

Chhotanagpur and Patkai ranges in the historic period. Thus iron age in South India would appear to be a safer terminology to adopt.

The burials found so far with iron from the Deccan can be grouped as follows:

1. Large urns are used with collected bones of previously excarnated dead bodies in them. These urns are kept with grave goods in a pit. The pit after covering can be marked by a circular demarcation made of stone.

2. Cists are made out of slabs of stones and may at times be covered with a similar flat stone to cover. There are sometimes post holes also curved out of the slab used as chamber walls.

3. Legged urn or sarcophagi used to encase the body before burial is another important pattern of these Megaliths.

4. Sometimes chambers have been cut out in the compact lateritic floor and then the body has been placed in it.

There are a large number of variations seen in the pattern in which each of these disposal systems are operationalized. In fact it would not be very wrong to state that within a couple of hundred miles the patterns change. The Megalithic arrangement on the ground to mark the grave also can vary from one kind of burial system to the other.

However, in spite of these external variations of grave pattern one can see a surprising similarity in other aspects. Black-and-Red ware, for instance, becomes one of the common denominators found almost without exception in all Iron age sites of Deccan India. The pottery types include carinated vessels, bowls with pedestals and spouted dishes besides a conical shaped lid often provided with a loop on the top. The iron implements which are common to all the megalithic sites are flat axes with crossed straps, sickles, tripods, tridents, spear heads, multiple lamp hangers, arrow heads and lamps. Horse harness bits and various ornaments used on the frontal region of the head of a horse including bells are also known from a number of megalithic burials.

The cultural reportoire of the megalithic builders appears entirely exotic to the pre-existing cultural canvas of the region. And this led many specialists to visualize a new population movement from west. The traditional homeland of Chalcolithic culture, i.e. West Asia, does not show the practice of megalithic burials and hence can no longer be taken as the source of dispersal of the iron using megalithic builder. Instead the coastal regions of south Arabia and the Levant show sarcophagi and cist graves during Iron age. The land

route to South India from Arab would have to include exactly those regions of Punjab and Haryana where iron occurs with an entirely different cultural association. This will, consequently, leave no option for us but to accept a population from Arabia having entered Deccan India through the sea route. Apparently these people did not create any urban settlements the likes of which we have witnessed in the Harappan period or during the phase of second urbanization in the Ganga valley. Megalithic builders might have maintained isolated gypsy like tented colonies where they might have bred and grazed horses to be traded with the newly rising political centers around the middle Ganga valley. We have very little archaeological evidence to demonstrate who these megalith builders were or for that matter why their knowledge of higher technology did not cause the rise of such urban trading centers which can bring about the growth of a complex civilization. Megalithic Iran age in Deccan India remained so much self-centered that it did not take much effort for the northern centers of power to spread their dominance into this region within a span of 500 to 600 years.

CHAPTER XII

The Sequel

An often asked question in Archaeology pertains to the rise of culture areas in the sub-continent. The brief outline gone into in the foregoing pages already indicates that such a question is not very easy to answer. If the western border of India shows a consolidation of one kind of culture during the Palaeolithic, in the subsequent period another area starts becoming an epicenter of another variety of culture. In the same way, if regions A and B are homogeneous during the Mesolithic, in a younger phase these regions can and might develop a set of quite diverse traits. The tangle can be carefully loosened by taking into consideration the various anthropological imperatives operative within a given culture. These imperatives are shaped on the basis of resource management potentiality of that particular culture and its ability to maintain sustained stability without conflict. In other words, so long as the Domestic Mode of Production underlines a given community and its cultural propagation, it will remain more or less illogical to seek a larger area of homogeneity. Historians might, at once,point out that the largest area of cultural homogeneity ever observed in human history is to be found in the Palaeolithic period. Handaxes, found in France, or for that matter, in as far off as in East Africa, have been found identically reproduced in India. This might apparently defy our anthropological premise. It is important, therefore, to remind ourselves of the two basic compromises we are persuaded to make in our methodology in Archaeology.

1) We have no precise method of measuring time accurately for a large chunk of the prehistoric period. That is, considering an individaul life span to be of only 20 years, for this period, we are mostly handling materials of 50 to 100 generations of the prehistoric hunters as a single cultural episode. Thus, if man had to be constantly mobile for this variety of economy, it may not be difficult to imagine the entire Old World Lower Palaeolithic to be the product of a single culture. Constant readaptation, which is an intrinsic ability of a culture to the vagaries of climate, raw material, fauna and flora might have brought shades of local characteristics. So then, Vaal technique or for that matter the overwhelming preference for flake-cleavers in the tropical belt could perhaps be looked at in the light of normalcy. Yet the same technique

might have acted as the initiator of the Levalloise exercise and hence the specialization of the Mousterians in France. At a conservative level this would seem illogical because it presupposes the Lower Palaeolithic in one country being broadly fitted into the same time slot of the Middle Palaeolithic in another. yet, in all probability, this might have been a fact.

2) Another assumption in prehistoric methodology attempts to reduce human culture to a tangible object or type. This has become such a convenient approach that many a prehistorian totally forget that types were basically enunciated for classification only and are not to be employed in understanding the concept of ethnicity. All the known human races of the world have an amazing 90% of their behavioral pattern as a blue print identicality and yet the difference of the 10% separates the Eskimo from the Hottentot. Under these circumstances all inter-regional comparisons would seem totally futile for much of prehistory.

We would then instead attempt to see how India got progressively populated during the span of its pre-agricultural milieu. Archaelogical data leave no doubt about the fact that upto 150,000 B.P., most parts of India were uninhabited. Around this time northern Rajasthan and north west Punjab may have maintained some very small and isolated bands. By 100,000 B.P. these populations may have got consolidated and spread to Saurashtra to the south of Rajasthan and to the Kangra - Shimla region in the north of Potwar. Around this time fresh populations from further west must have kept invading in repeated waves. Thus, from Rajasthan in all probability a southward migration started taking place between 100,000 to 60,000 years ago. Central zone, eastern zone, Chirki, Hunsgi and Krishna-Godavari sites can all be taken as forming a central cluster of the Acheulians.

Due to the climatic shift in the subsequent period, India seems to develop fresh areas of colonization. But it shows the onset of this change much later. Is it so because the climatic shift took place much later in India, is a question that must however be left to conjecture. But it is interesting to observe many areas of earlier attraction giving way slowly, to others. Instead of the Rajasthan-Gujrat river valleys, the presently dry areas like Pushkar and Hokra maintained small holdings of these late Palaeolithic colonies. In the south, these people really consolidated in a heavy number all along the Krishna and the Godavari as also their numerous tributaries. The Vindhyan extension of the Ganga valley might have also been another area chosen for consolidation. The Chhotanagpur region of Bihar and northern Orissa is replete with

Acheulian tools found in association with flakes and blades formed out of a variety of different raw materials. Seen in this light, one can perhaps point out the rise of 'cultural regions' in India for the first time. Thus while Chhotanagpur acts as a separate region, the Gangetic Vindhyas maintain their typical Central Indian features. Likewise, while the Godavari and her tributaries develop specialized features of their own, the Krishana valley seems to get colonized relatively later in time and hence incorporate more of the Upper Palaeolithic traits.

Holocene brought fresh areas under occupation, but the older areas of occupation also seem to maintain marginal and conservative groups. In the latter instance, their areas of activities might have been shifted to the mountains. Mesolithic population in India had to probably bear the maximum stress of its social environment and repeated pressures from all directions. At some places they confronted the Neolithic or even the Chalcolithic colonizers with altogether different imperatives mercilessly spreading their tentacles into their domain. The 'arrowed'individual of Sarai Nahar Rai is but a solitary example known today of this conflict. There might have been a higher incidence of such violence where conflict occured rather than at places where a symbiotic relationship might have taken birth out of a possible avoidence of the same, where no square confrontation took place resulting into a higher culture.

The entire Chhotanagpur area appears to have developed this variety of culture contact. Archaeologically, therefore, we have pure microliths leading to microliths along with black and red ware pottery and copper slag and finally microliths along with contemporary hunter-gatherers.

A proper peasant society with probable chiefdoms of a variety of forms evolved but in entirely different areas and with different levels of environmental exploitation. Thus, while in the Kashmir valley or in north Bihar hunting perhaps formed as important a component of economy as a sturdy single crop or even a crop once in a while, at Mehergarh or for that matter scattered along the Baluchistan mountain springs, there seems to develop another variety of peasantry with more emphasis on animal husbandry-sheep and goat keeping/tending as a subsidiary economy. Surprisingly Rajasthan,Haryana or western U.P., during this period, attracted no Neolithic occupation. Instead the areas in the Central Zone started developing a series of late Neolithic villages. One of the biggest enigmas in Indian Prehistory is this lag of time in the emergence of chiefdom and village

economy. We take this as a classic example of the lack of adequate social organization necessary for an earlier emergence of a functioning chiefdom. Either the population density in most of these regions in India could never reach that form of a critical limit which sets off economic intensification or the environmental biomass did not suffer any such degree of decline so as to necessitate the change. Further, when economic contacts are established between higher cultures and the hunter-gatherers, the latter are seldom seen to develop into a chiefdom as a natural process of growth. It is no wonder that proper ruralization of India occured only after the desertion of Harappan centers. The faint and distant similarity of some ceramic forms in these late Neolithic centers with the Harappan ceramics can only further demonstrate the point.

Development of regional characters in India starts around this post-Harappan period. Gujrat separated as a single area while north Rajasthan spread into Haryana and formed a separate region. South Rajasthan spread along the Banas and formed a 'thoroughfare region' for Central India. Northern Maharashtra developed as another insular zone, offering yet another corridor to the regions further south, in Krishna-Tungabhadra basin. A group in the southern peninsula among these took to an over-emphasis on pastoral economy. There is virtually no change in the quality of culture in all these regions for the entire Copper Age. The metal axes could provide fire-wood much more efficiently and in less time to these fast consolidating chiefdoms. The surviving populations of late Mesolithic, which could establish their economic symbiosis with the higher cultures primarily on the basis of their assured supply of wood and other forest products started getting isolated. *These isolated groups form the majority of the contemporary tribals of India.* Those who had a larger populataion, could take to some forms of crude agriculture while others who were numerically weaker, kept on hunting and gathering like the Birhors of today. The Todas of the Nilgiris likewise, can be taken as the survivors of the Ash Mound Neoliths of South India.

Around the first millenium B.C. strong political centres developed in different regions of Gangetic plains. But in the south a peculiar group,with an overspecialization in horse-rearing, consolidated and spread over the entire Krishna basin and further south. We have called this group as peculiar because they had iron, copper and precious stones and yet maintained almost a 'tribal' culture. It would appear that these were the earliest ranchers of India. With the spread of warring kingdoms, these ranchers were the first to get absorbed and converted into the kings' retinue, but the hunting-gathering

tribes continued to survive without change.

The only area which did not participate in this metamorphosis towards regions'-formataion is the entire eastern sector-east of the Ganga. The hills around Brahmaputra valley have been populated by repeated transhumance from both China as well as South-east Asia for the entire period of the Neolithic and the Chalcolithic.

Glossary

1. Abbevillian :

oldest Industry of the European Palaeolithic named after Abbeville on the Somme river in north France where it was first discovered. It is characterized by crude, massive handaxes. These are prepared by stone hammer technique and usually carry very few or no secondary flaking.

2. Acheulian :

This term was adopted from St. Acheul on the Somme where a characteristic Lower Palaeolithic form was first described. It is characterized by medium sized handaxes and cleavers. This is believed to have been directly evolved out of the Abbevillian and hence the total cultural phase is also referred to as Abbevillio-Acheulian. Cylinder hammer technique used for final shaping acts diagnostic for the Acheulian.

3. Aggradation:

The phase in the rivers when heavy material can be transported. Such phases are usually connected with the wet phase and hence pluviataion.

4. Agricultural Revolution:

Emergence of economics which are able to rely on domesticated plant and animal resources. The management of these economies is carried out by such a mechanism that enables production and storage of surplus without social conflict.

5. Alluvium:

Sediments deposited by a river. These can be constituted by both big boulders and gravels as also by fine clay. The former is taken to interpret a very wet climate while the latter indicates a relatively dry phase.

6. Archaeology:

It basically means the study of antiquities. In an extended sense, the study of Archaeology means the reconstruction of the history of a region. The process of socio-cultural change through time, however, does not interest a classical archaeologist.

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Emergence of economies which are able to rely on domesticated plant and animal resources. The management of these economies is carried out by such a mechanism that enables production and storage of surplus without social conflict.

5. Alluvium:

Sediments deposited by a river. These can be constituted by both big boulders and gravels as also by fine clay. The former is taken to interpret a very wet climate while the latter indicates a relatively dry phase.

6. Archaeology:

It basically means the study of antiquities. In an extended sense, the study of Archaeology means the reconstruction of the history of a region. The process of socio-cultural change through time, however, does not interest a classical archaeologist.

7. Artifact:

Also spelt as artefact. Literally means an objeact artificially created. In an extended sense, artifacts act as the basic clue to understanding group behavior.

8. Assemblage:

The total cultural left-over found at an archaeological site which belongs to the same level or time.

9. Band:

It is the name given to the simplest form of organization which is identified among the apes, The duties and obligations between members of a band are limited to group protection and mating code alone. Often a leader emerges on the basis of physical power.

10. Biface:

This is a name suggestd by Francois Bordes in order to bring handaxes and cleavers under a single tool-type category. By definition these are core tools flaked from both surfaces but do not include flakes which are bifacially worked like the leaf-points. But then neither are the bifacially worked discoid cores or discs customarily considered a biface. Thus it is safe to consider it as merely a synonym of handaxes and cleavers.

11. Black and red ware:

A specific kind of ceramic which is burnt black from the inside and is red on the outside. Usually limited to bowls and dishes and with very little decoration done with white paint. Distributed all over India. In western India this ware occurs earaliest in association with copper. In eastern India it occurs 500 to 600 years later in associataion with the late Neo-Chalcolithic. In southern India it occurs yet another 500 years later in association with iron and megalithic burials.

12. Blades:

This term can be used for any flake which has a length equal to or more than twice its breadth, In practice, the term refers to flakes which have parallel borders and uniform thickness along their length. Thus the blade technology would indicate a specific development which is often taken to mark the emergence of the last lap of the Palaeolithic or the Upper Palaeolithic.

13. Brachiation:

Locomotion by swinging from branch to branch with the arms overhead. As opposed to this, ground living required a large degree of modification in the skeleton itself which released the hands for the function for which the hands were created. The origin of culture is linked with this stage where hands are freed from the functions of locomotion.

14. Chiefdom:

A cultural system which resolves contradictions of a pure domestic mode of production by ensuring a reciprocal movement of surplus goods with services within the community. This is operationalized by the chief with help of retainers. Some chiefdoms can specialize to such an extent as to maintain full-time professionals for the community.

15. Chopper/Chopping tools:

Usually prepared on a pebble. Few primary and secondary flakings are done to prepare a transverse working edge. When unifacial, it is called a chopper and when bifacial, a chopping tool.

16. Culture Area:

The term was originally used by the German Human Geographers of the last century (Kulturkreis). Clark Wissler used it to analyse cultural metamorphosis. It means a geographic area inhabited by people sharing a similar culture.

17. Debitage:

Chipping waste resulting from the manufacture of stone tools. Usually these include various forms of cores, flakes and chips.

18. Detritus:

When primary laterite is washed by seasonal rains and silts and gravel from it, stained red are the resultant deposits, such deposits are referred to as secondary laterite or detritus.

19.Diffusion:

A common English word meaning 'spread'. In Anthropology, this term is used as one of the several approaches to express the process of culture change. Contact through trade, population migrataion, invasion or even matrimonial exchange can be counted as modes of diffusion.

20. Domestic mode of production:

A type of economy that is characteristic in the Palaeolithic hunting and gathering band. It can creat serious redistribution problems which may be solved by transition to chiefdom. When economies are oganized by domestic groups and kinship relations, it creates centripetal force within a domestic group and centrifugal force between families within a band.

21. Econiche

Environmental zones or niches that exhibit specific and consistant clusters of plant and animal species with equally specific climatic conditions.

22. Ethnography

Documentation of cultural patterns, which include basic information about people's technology, subsistance system, social organization, ideology and language.

23. Flake tools:

Any specific type of border working which is visible on a flake and which is identically repeated on several other flakes. It is demostrated that flake tools can yield more than ten times the amount of working border possible from raw mataerial converted into a core tool.

24. Homo erectus:

The second level in human evolution. It was first recorded from Cheswanja in East Africa. This generalized human race had a brain size which was about 2/3rd of the modern human brain size. It is believed to have lived for the longest duration of period in the evolutionary history of man. Handaxes, cleavers, clactonian and levalloise flakes are the main tool types typically evolved and perfected by them.

25. Homo sapiens:

It is the earliest form of a full man. At certain places it is found in an overspecialized form at its initial stages. This overspecialized form is called the Neanderthal. Both the Middle and the Upper Palaeolithic cultures are the result of this form.

26. Hydraulic Society:

In 1955 Karl A.Wittfogel argued that agricultural societies change towards Statehood when irrigation is managed by a centralized political system. He

named these societies as 'Hydraulic Societies'. He further argued that this kind of social formation seems to be more evidenced towards and in the east of European countries and to suit his thesis, coined the term 'Oriental Despotism' for them. The concept has since then been challenged by many experts on rather substantive grounds.

27. Ideology:

Since culture is the set behavior common to a group of people, this commonality must have shared belief structure is but logical. Thus ideology refers to the ideas and beliefs that a group shares in orader to behave and act in a 'common way'.

28. Industry:

This usually refers to a collection of similar assemblages. The similarity is normally of the raw material, so that we have such expressions as Stone Industry or Bone Industry.

29. Interglacial:

It is the warm period between the two glacials. Usually this is marked by proliferation of plant and animal types.

30. Interpluvials:

It is the relatively drier climate between two pluvials.

31. Interstadials:

Periods of relataive warmth during the presence of the glacial. Fauna and flora can develop during these stages but they are usually the cold loving varieties.

32. Late Stone Age:

This is the same as the Mesolithic in Europe.

33. Laterite:

A thick reddish crust found in tropical mountains. These crusts are rich in iron and aluminium oxides. These are caused by heavy rain in the past. These weathered red rocks are referred to as primary laterite.

34. Levalloise Flake:

It demonstrates the human planning for obtaining a desired flake. Since thinning a normal flake always results into its breaking, to counteract which, it appears, man prepared a desired dorsal surface on the core from which he

could finally detach dorsal flake. It is known to occur from the time of late Acheulian period and continues to occur even in the Mesolithic phase. A Levalloise flake, being consistant in its techno-morphological features, is not counted as a mere artifact, but also as a tool bank. When retouched into a type, it gets the status of being a tool type.

35. Loess:

Fine clay-like silt deposited by winds is referred to as loess. Usually the glaciated regions exhibit huge deposits of loess.

36. Mesolithic:

This literally means Middle Stone Age (not to be confused with the term Middle Stone Age in India). The gap occurring between the cultures following the Pleistocene and the onset of agriculture is called the Mesolithic. Usually microlithic tools occur during this stage.

37. Middle Stone Age:

In India and Africa the Late Palaeolithic Culture is termed as the Middle Stone Age. In European terms, it includes both Middle and the Upper Palaeolithic Cultures.

38. Neolithic:

The term literally means New Stone Age. Culturally, this marks the beginning of productive economy and preceds the discovery of metal. In practice, polished celts, ring stones, grinders, pottery, domesticated cereals or animal remains and settled village sites -indications of which found in combination or individually, are taken as archaeological evidence of the Neolithic.

39. Painted Grey Ware:

Iron in North India appears with a very fine fabric of ceramics which has been fired at such a high temperature that it turns grey in colour. Some decoration with thick black paint is done on them. The shape in this fabric is limited to dishes and bowls only.

40. Palaeolithic:

This literally means the Old Stone Age and in practaice includes the cultures occurring during the Pleistocene period. From the time man appears on the scene to almost 15,000 years from today forms the duration of this composite culture. Since it spans a period of almost 1.6 million years, it is divided into three sub-periods as follows:

a) Lower Palaeolithic. (1.8 M.Y.-200,000 Y.) constituting handaxes, cleavers and chopper-chopping tools.

b) Middle Palaeolithic. (200,000-36000 Y.) constituting such medium sized flake tools as side-scrapers and points.

c) Upper Palaeolithic. (36,000-8,000 Y) constituting blade and bone tools.

41. Pit Dwelling:

In the areas of extreme cold, dwelling structures at some places were constructed by digging a pit in the ground. The mouth of the pit used to be covered by a thatched structure. At Burzahom, steps are cut out to descend below. In many of the pits the steps stop before reaching the floor. It is argued that a movable ladder used to be attached to this gap for going and coming freely. At night these ladders could be removed so that an easy access to the lower floor was ruled out.

42. Pleistocene:

The period between 4 million years ta 10,000 B.P. is covered by the term Pleistocene. It marks the evolution of apes and man. The last third of this period is also marked by a series of climatic extremes which occur as glaciations in the temperate regions and as pluviations in the tropical regions.

43. Pluvials:

Extreme wet phases when rivers and lakes were filled to the brim is called the period of pluviation. The power of carrying load by the rivers, more than it would be able to carry normally, increased and hence boulder and gravel deposits are taken to represent such a period.

44. Prehistory:

It literally means the era preceding the phenomenon of the emergence of writing (which marks the beginning of history.) In practice, a Pre-historian is more interested in economy, social organization and the process of culture change than an archaeologist. The latter has more of a historian's approach while the former prefers to use models of cultural Anthropology.

45. Protohistoric:

This term describes people who remained without writing and yet demonstrate (with the literate group) and well developed settled life.

46. Radiometric:

It is a method of measuring age by the estimation of the decay rate in unstable isotopcs.

47. Seriataion:

The process of ordering a series of artifacts in terms of relative similarity, with the most unlike placed farthest apart. Thus the degree of techno-morphological gradation can be taken to ascertain the relative age of a given object.

48. Settlement Pattern:

This term can be described as the distribution of different areas of human activities. (eg. village site, factory site, kill site etc.)

49. Site:

It is the basic unit of space investigated by an archaeologist. Often the site can extend much beyond the region investigated by any one archaeologist. When another archaeologist discovers sites from the extended region, such sites are referred to as localities. Thus one can have several localities of a site.

50. Social Formation:

A concept used by Marxian sociologists to indicate a mode of production or a combination of modes of production defined as a specific configuration of forces of production and relations of production and their condition of existence and reproduction.

51. Social Organization:

The term describes the pattern in which all the members of the society are organized in terms of duties and obligations. This enables people to satisfy their biological and cultural needs without creating conflict. Every generation of the community reproduces the parental organization by the inbuilt mechanism of enculturation.

52. State:

Monopoly of power at the disposal of any government in a class stratified society. Usually the various social strata found in a statehood are--a) Primary producers b) Professionals c)Military and d)Bureaucracy.

53. Technology:

This term describes the means of improvising the methods of the retrieval of resources. Normally this involves shaping and assembling of natural resources/objects for the satisfation of human needs.

54. Terrace:

These are the bench-like features left along the valley sides. Usually these are caused by the down cutting of the river which flows at the bottom of the valley. Since each of the terraces represents the earlier bottoms of the river, the top-most terrace is the oldest as far as the date of its formation is concerned.

55. Tradition:

When similar archaeological material occurs over a reasonable area through a reasonable period of time, such a group can be taken to indicate a tradition. Thus we can have a core tool tradition or a blade tool tradition.

56. Tribe:

When a number of bands organize themselves on the basis of geographic proximity to increase survival potentiality, they give rise to a tribe. Modes of production need not change although a broad spectrum exploitation becomes easy.

57. Vaal Technique:

This is a technique of finishing a handaxe in such a manner that the ventral surface gets a flat scar which renders a V-shaped cross-section to the tool. It was first described from sites around the Vaal river in South Africe. Bordes felt that since this requires the prior preparation of a biface and then the delivering of the tranchet blow from one of the surfaces, it should be considered as a precurser of the Levalloise technique. Hence he called this a 'para-Levalloise technique'. In Bhimbetka (India) this technique is commonly recorded.

58. Victoria West:

This is a term to explain massive handaxes prepared by bold flaking from the undersurface in order to converge into a keel-like feature on the dorsal surface. The undersurface may be formed by a single hollow scar or even the original cortex. A large number of these handaxes are found in the Attirampakkam region.

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Annexure

The decline of Indus Valley Civilization

Generations of Archaeologists have come out from the schooling of an 'Aryan invasion theory' to explain the decline of Indus Civilization. It was believed that the 'Aryans' coming by way of Afghanistan invaded north-west India and overthrew the walled cities. Based on several Indian literary sources this event was believed to have taken place around 1500 B.C. Indirectly evidences of sorts found in the two sites at that time (Mohenjodaro and Harappa) were linked with incidents and characters described in the *Rigveda*. Thus, Indra who is described as the destroyer of forts (*Purandara*) is shown as having destroyed the fortified Harappan cities in order to earn that name. Layers of ash and evidence of fire were likened to the description of Indras destroying Dravidian castles by putting them ablaze.

Obviously these inferential theories had no or very little conclusive archaeological evidences to stand on. Absence of proper dates for many isolated surface finds from further west prevents us from ascribing confirmed dates for many events in the Indus where strikingly similar objects have been recovered. Likewise a lack of our understanding of the true functioning of the Indus society acts as one of many such hurdles. Both Gordon Childe and Sir Mortime Wheeler, despite these hurdles had continued to maintain that the decline of Indus Valley is linked with the 'Aryan' invasion of these regions.

Marshall and Mackay, who had conducted the main excavation at the two major sites had originally commented that repeated flooding of the Indus had eventually led to the destruction of the civilization. Cities must have been deserted during these devastating floods and this must have made it easy for the Barbarians to take over. It still does not explain why the decline of the civilization as observed in the northern sites is not similar in kind when compared with the same in Saurashtra. But at least this was based on archaeological evidences such as reinforcement of the walls and river silt depositions in the site. Recently Lambrick proposed a slightly modified theory of repeated shifting of the river basin. Raikes has proposed an elaborate argument of another modified process of sudden flooding and

inundation of the entire region. According to Raikes a massive tectonic movement caused the formation of a dyke like feature across the Indus a little south of Mohenjodaro. This created both silting and inundation of the areas north of Mohenjodaro and dried off the river below this site. Thus, in either direction it caused disaster to both cities and their primary economic base. But Raikes' theory met with strong opposition from most of the archaeologists working in the field. According to these critics no such evidence of tectonic activity nor any kind of dyke structure large enough to stop the river flow is known or reported so far.

If by the term 'Aryan' one were to understand the culture which had harnessed horses to chariots and those who spoke Indo-European language besides having fire worship etc., we can scarcely hope to demonstrate these characters from archaeological ruins. It is true that the earliest reference of war chariots is known from Samsi-Adad (1800 B.C.) in north Syria but, for the Harappan sites, we are yet to demonstrate the presence of horse conclusively. In the Boghaz keui tabulets dated to 1380 B.C. refering to a war treaty of the Hittites one can see the mention of such Rigvedic gods' names as *Mitra*, *Varuna* and *Indra*. But again this is nearly 400 years later than the date of the end of Indus Civilization. Under the circumstances as above an "Aryan Invasion" as a direct causative force for the decline would not seem very tenable. This would mean that the arrival of the Indo-European speakers and the cause of the decline of Indus Valley have to be treated as mutually exclusive phenomena separated by time.

In this regard the recent analysis of this issue by prof. V.N. Misra will appear to be extremely appealing. In the recent years palaeo-channel studies have demonstrated that several Himalayan flows used to disgourge huge quantity of water into the Gaggar, which in turn used to flow into the Indus through the Sutlej. These feeder channels of Gaggar have been demonstrated to have changed progressively towards the south east in the past. It is true that we have no dates for these events, but we have evidence that the main feeder channel had changed its earlier course and shifted to Chautang. This did finally meet the Ghaggar but at a far more easterly shifted spot near Suratgarh. The final and the last shift completely disconnected the feeder channel from the Ghaggar system. It is believed to have now joined the Ganga system at its northerly hilly slopes. This resulted into the complete drying up of the Ghaggar and deprived the Sutlej and hence the Indus of a large amount of its water contribution. Misra argues brilliantly to show how this might have caused gradual silting of the Indus and thus could, in due course of time, bring about a crush in the economic surplus which had maintained the management of labour, craft and trade operations. That such an event was not sudden is almost certain. A gradual migration of the artisans and tradesmen towards Saurashtra and Haryana must have started as early as 1900 B.C. Even at the original Indus Valley towns we see the emergence of an altogether changed feature of the Jhukar and Jhangar culture. There is quite a possibility that this phase represents the first shift of the Ghaggar feeder to Chautang. People with trade connections had always maintained human contact with the Indus Valley with various principalities further west which in turn may had contact with the Sumerians first and then the Babylonians. The Indo-European speakers finally entered the Indus plain during these 200 years of slow degeneration of the Indus economy. They might have come in several waves and brought their culture but their being the cause of destroying Indus culture does not seem attested by either the archaeological evidences or by the numerous revised radio-carbon dates for the various stages of the culture now available.

DHOLAVIRA

The most remarkable Indus City discovered.

Ever since the basic characters of Indus cities were tentatively worked out on the basis of the major excavations at Harappa and Mohenjo-daro, more and more sites are coming to light. These are both of varying nature as also extension. The sites on the western extesion across the Indus are probably as variant in their specific details as those known from the eastern extension of the Civilization from Haryana, Gujrat and Rajasthan.

One of the largest known Indus sites in the world has now been discovered in a modest village in Bachau taluka of district Kutch in Gujrat. It is situated on the north-western corner of the **Khadir,** which is a large island surrounded from all sides by the Great Rann of Kutch. It was discovered way back in 1967-68 by the then Director General of Archaeological Survey—Shri J.P. Joshi. It is being excavated by Shri R.S. Bisht, now for almost a decade. The excavation has confirmed a stratigraphic sequence of pre-, mature and post-urban Indus cultures through an enormous regular occupational deposit of 12 meter thickness.

The first occupation of the site was by a population similar to the Amri type Pre-Harappan group, who have left behind a 60 to 70 cm. deposit. They were familiar with the use of moulded bricks measuring 36 x 18 x 9 cms, and also the manufacture of wheel-made pottery of diverse fabrics decorated in different styles. They had also acquired technical knowledge of copper working and stone dressing. A huge mud-brick fortification wall, extant to a height of 6·30 meter was found around the dwelling area. It was successively plastered with bright clays of white to pink hues. The Harappans came there quick on the heels and used the same very wall. After a century or so, the Harappas added from inside a 5 meter wall with an elevated walk to the existing defence.

For over 9 meters deposit which is indicative of a considerable duration, the Indus culture maintained its classical character in all spheres. The decline coincides with the arrival of a new set of people—quite probably from Sind. They continued the classical traditions for some time and carried out repairs to the defensive system with inferior workmanship and unaesthetic changes. Decline became more rapid probably following the desertion of the city by the elites. After a short desertion a new group of people appeared on the scene. **Unlike their forerunners, they lived in circular stone houses which are still in vogue in Gujrat and are called Kudas.** Surprisingly these new groups are found to continue with the same ceramics and other items which their predecessors had made and used.

It is apparent that much thought and imagination has been used in the planning and construction of the city. The city has been planned in accordance with the magnetic orientation of 6° off the cardinal direction. Such an astronomical precision as this is not only astounding but also indicates high scientific knowledge of the Harappans. The city proper was conceived as a perfect rectangle measuring 770 meter East-West and 616 meter North-South (a ratio of 5 : 4). This is bounded by a massive mud-brick masonary wall. Inside this wall there are three principal divisions which on the bases of their relative position have been named as **Citadel, Middle Town and Lower Town.** Significantly the first two divisions, i.e., the **Citadel** and the **Middle Town** have their separate and yet inter-connected fortification system. The **Lower Town** has no such fortification but all the three areas are within the general fortification.

The **Citadel** contains two conjoint subdivisions both secured by walls. The higher one which is in the east is the most carefully constructed and zealously guarded by thick and high walls which are opened only by two gateways. Each of these are furnished with a flight of steps leading to a long passageway flanked by two elevated chambers and a lofty terrace in the front. Each of the two side walls of the sunken passage way supports a set of highly polished blocks at either end and an equally polished pillar base shaped like an hour-glass in the centre. The north gate is the most majestic and elaborate of the two. It overlooks a broad and open space which separates it from the fortified **Middle Town.** Interestingly this open space is found nicely levelled and floored successively during the length of the mature phase. It appears that this space was used for royal, social and/or religious congregation presided over by the 'supreme authority' seated in the chamber of the north gate. **Such a design of a Harappan gate as well as use of highly**

polished architectural members is till today without any known parallel.

The finding of an inscription consisting of 9 large characters may indeed be called the discovery of the century. Each of these characters is made by arranging several pieces of milkwhite rock, mineral or paste or a crystalline nature. Each of these letters measures 37 x 27 cms. This epigraphic 'sign board' is imbedded in the structure on the north gate. **This is another unique Harappan find not recorded anywhere till date.**

Finally, the third and perhaps the most significant feature of Dholavira is the evidence of a large water reservoir provided in the heart of the castle. This is 13 meters wide and has a length of more than 35 meters. A fine net-work of drains is used to collect rain water and lead it to this reservoir. Water collected at several spots which are connected with polished water-chute into deep chambers. A drain issuing from the chamber led it to the reservoir. Many of these connecting pipes are of terra-cotta.

Other important finds include microdrill bits made out of hard stones, seals, seal impressions on clay and one bronze figurine of an animal. Seals bear short epigraphs in the Harappan script and many of them are engraved with unicorns and other animal forms. Beads of semi-precious stones, gold, copper, shell, steatite, faience and clay objects, usual copper objects including a pin with two spiral heads, bangles of stones, terra-cotta models of cart frames, wheels, animals, gamesmen, triangular cakes and a variety of stone querns, grinders, rubbers, polishers, pestles and mortar used for domestic as well as for manufacturing purposes are the other objects recovered.

Dholavia opens an entirely new avenue of enquiry about the connection of the Harappans with the 3rd millenium B.C. occupations from Oman and Yemen in the Arabian coast land, and hence possibly also with the African continent. Cultivation of millets in these Arabian sites might have subsequently influenced the Indian groups of later chalcolithic occurrences. At least the arrival of **Ragi** and **Hulgi** in the Deccan Chalcolithic need not now be taken as a parallel evolution with Africa.